Support for the implementation of the provisions on ILUC set out in the Renewable Energy Directive – Lot 2
Mitigating ILUC: Pilots and review

Final report

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Table of Contents

List of Tables

List of Figures

Abstract

The **Low ILUC-risk Certification Pilot project**[1] supports the European Commission in the **development, implementation, and improvement of low ILUC-risk certification** – the criteria for which are set out in Delegated Regulation 2019/807[2]. A second aim of the project is to **review the relevant aspects on low ILUC-risk certification** described in the feedstock expansion report[3] that accompanies the Delegated Regulation.

The project developed a **certification guidance, audit checklist and management plan**, which were tested in ten pilot projects by professional auditors and can be adopted by Commission-recognised voluntary schemes[4] to certify low ILUC-risk. The certification guidance, audit checklist and management plan have been designed to be **used for any type of feedstock in any region and at any scale**, and including a description of how to align with group certification approaches in existing voluntary schemes to minimise administrative burden. This certification can be implemented as an **add-on module** by any of the existing European Commission-recognised voluntary schemes **to avoid a phase-out if the claim is for a high ILUC-risk feedstock.**

[1] "Mitigating ILUC: Pilots and Review", contract number ENER/C2/2018-462 Lot 2

[2] Commission Delegated Regulation (EU) 2019/807 of 13 March 2019: https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=uriserv:OJ.L_.2019.133.01.0001.01.ENG

[3] European Commission COM(2019)142, 13 March 2019: https://eur-lex.europa.eu/legal-content/en/TXT/?uri=CELEX%3A52019DC0142

[4] https://energy.ec.europa.eu/topics/renewable-energy/bioenergy/voluntary-schemes_en

Abstrait

Le **projet pilote de certification « Low ILUC risk » (faible risque de changement indirect d'affectation des sols)** [5] vient en soutien de la Commission Européenne dans le **développement, la mise en œuvre et l'amélioration de la certification « Low ILUC risk »**, dont les critères sont décrits dans le Règlement Délégué 2019/807[6]. Le deuxième objectif de ce projet est de réviser **les aspects importants de la certification « Low ILUC risk »** tels que décrits dans le rapport « feedstock expansion »[7] qui accompagne le Règlement Délégué.

Le projet a permis de développer **un guide de certification, une checklist pour les auditeurs, et un plan de gestion**, qui ont été testés sur 10 projets pilotes par des auditeurs professionnels et peuvent désormais être adoptés par des systèmes de certification volontaire approuvés par la Commission [8] afin de délivrer une certification "low ILUC risk". Le guide de certification, la checklist et le plan de gestion ont été structurés pour s'adapter à tout type de matière première, quelle que soit l'échelle de production et la région. Ils incluent des indications pour minimiser les démarches administratives en alignant un module "low ILUC risk" avec les procédures de certification en groupe. Ce module peut être mis en œuvre en complément par tout système reconnu par la Commission Européenne afin d'éviter à des opérateurs économiques de **devoir cesser de produire ou utiliser des matières premières ou des biocarburants classés à haut risque (« high ILUC risk »).**

[5] "Mitigating ILUC: Pilots and Review", contract number ENER/C2/2018-462 Lot 2

[6] Règlement Délégué (UE) 2019/807 de la Commission du 13 mars 2019: https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=uriserv:OJ.L_.2019.133.01.0001.01.ENG

[7] Commission Européenne COM(2019)142, 13 March 2019 https://eur-lex.europa.eu/legal-content/en/TXT/?uri=CELEX%3A52019DC0142

[8] https://energy.ec.europa.eu/topics/renewable-energy/bioenergy/voluntary-schemes_en

Executive Summary

This report sets out the findings from the **Low ILUC-risk Certification Pilot project.**[9] The project supports the European Commission in the **development, implementation and improvement of low ILUC-risk certification** – the criteria for which are set out in Delegated Regulation 2019/807[10]. A second aim of the project is to **review the relevant aspects on low ILUC-risk certification** described in the feedstock expansion report[11] that accompanies the Delegated Regulation.

The project team is led by Guidehouse, supported by ISCC (International Sustainability & Carbon Certification), Control Union, E4tech (ERM Group), Cerulogy and IEEP (Institute for European Environmental Policy). The project was conducted in two phases, running from 2020 to 2023. Findings from the first phase fed directly into Annex VIII of the Implementing Regulation 2022/996 on voluntary scheme certification, which was published on 14 June 2022.[12] Findings from the second phase provide recommendations to the European Commission to further improve the low ILUC-risk certification in upcoming policies, including but not limited to the revised feedstock expansion report and EU RED III (Directive 2023/2413, which is the amended REDII, Renewable Energy Directive 2018/2001).

What are low ILUC-risk biofuels?

Indirect land-use change (ILUC) occurs when the additional demand for land to produce biofuels, bioliquids or biomass fuels leads to the expansion of agriculture onto land that has other uses. If this agricultural expansion results in net reductions of carbon stocks in biomass and soils (for example by conversion of high carbon stock lands like forests or grasslands to agricultural land), it could (partly) negate the greenhouse gas (GHG) savings obtained by using biofuels. Delegated Regulation 2019/807 details criteria to define **high ILUC-risk** feedstocks, which are those for which a significant expansion of the feedstock production area into land with high carbon stock is observed. In the Renewable Energy Directive 2018/2001 (REDII), Member States must limit **high ILUC-risk biofuels** to the 2019 level and must phase them out by 2030, unless they are certified as **low ILUC-risk**. The concept of **low ILUC-risk biofuels therefore offers an opportunity for economic operators to avoid the phase out of high ILUC-risk fuels.**

Core to the concept of low ILUC-risk biofuel certification is to demonstrate that **'additional biomass'** is being produced through the introduction of an **'additionality measure'**. That could be a measure to increase yield on an existing farm or plantation, or to enable cultivation on unused, abandoned or severely degraded land. In that way, the economic operator demonstrates that more biomass is produced compared to the situation without the additionality measure, meaning that displacement of food and feed production is avoided.[13] In this way, food and feed based biofuels do not displace the existing use of crops for food and feed, but instead are produced from a new feedstock base which is additional to current production levels.

[9] "Mitigating ILUC: Pilots and Review", contract number ENER/C2/2018-462 Lot 2

[10] Commission Delegated Regulation (EU) 2019/807 of 13 March 2019: https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=uriserv:OJ.L_.2019.133.01.0001.01.ENG

[11] European Commission COM(2019)142, 13 March 2019: https://eur-lex.europa.eu/legal-content/en/TXT/?uri=CELEX%3A52019DC0142

[12] Implementing Regulation (EU) 2022/996, 14 June 2022: https://eur-lex.europa.eu/legal-content/EN/TXT/PDF/?uri=CELEX:32022R0996

[13] Delegated Regulation 2019/807 Article 2(6) defines 'additional feedstock' as "the additional amount of a food and feed crop produced in a clearly delineated area compared to the dynamic yield baseline and that is the direct result of applying an additionality measure"

The objective of this project is to translate the low ILUC-risk criteria into **certification guidance** that can be implemented as an add-on module by any of the existing European Commission-recognised voluntary schemes[14] for biofuels, bioliquids or biomass fuels to offer an additional "low ILUC-risk" claim and avoid the above-mentioned phase-out if the claim is for a high ILUC-risk feedstock.

The development and testing of Low ILUC-risk Certification Guidance

The **Low ILUC-risk Certification Guidance** developed as part of this project can be rolled out by **European Commission-recognised voluntary schemes**, subject to approval by the Commission that the scheme scope is extended to cover low ILUC-risk fuels. The certification guidance has been designed so that it can be used for any type of feedstock in any region and at any scale, and including a description of how to align with group certification approaches in existing voluntary schemes to minimise administrative burden.

The practicality, accessibility and robustness of the certification guidance has been tested and further refined through **ten agricultural pilot projects** (five in each phase of the project). **Figure 1** below gives an overview of the ten pilot projects, which cover farms and plantations in three different geographical regions (Europe, South-East Asia and Latin America), different types of crops (oil crops and starch crops) and different types of "additionality measure". The pilot projects cover a range of additionality measures, including measures to increase yields on existing farms or plantations, the introduction of sequential cropping (to produce an additional crop on an existing farm, also referred to as intermediate cropping), and cultivation on abandoned or severely degraded land.

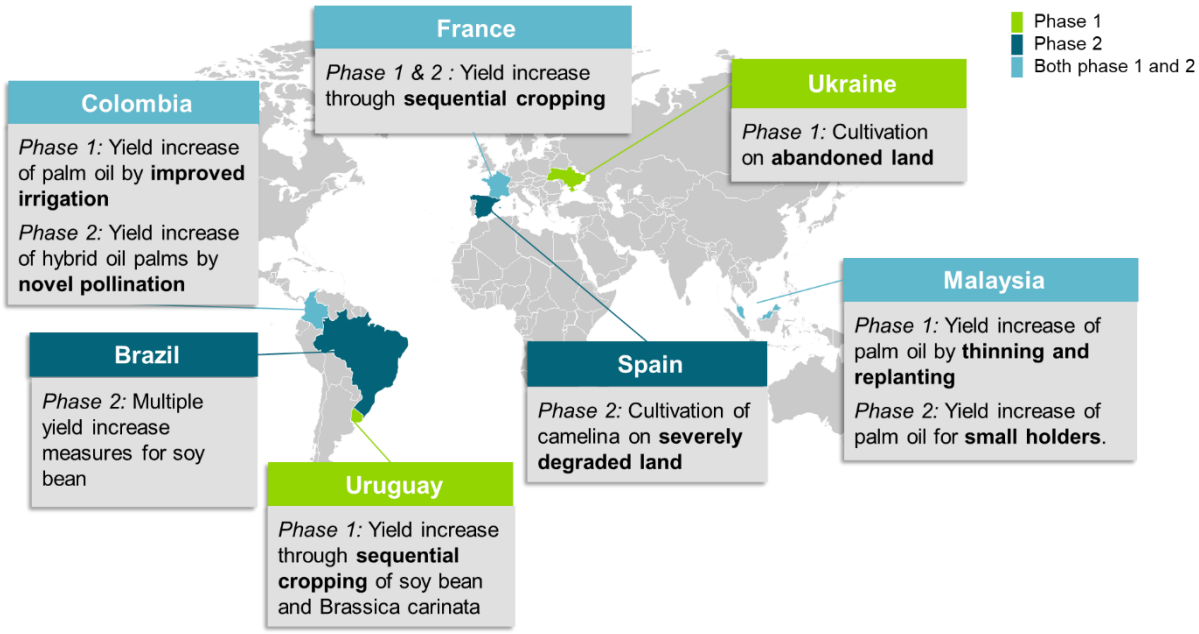

Figure 1. Map overview of pilot projects

Alongside the certification guidance, the project team developed an audit checklist and management plan, which were tested in the pilot projects by professional auditors and can be adopted by Commission-recognised voluntary schemes to certify low ILUC-risk. Individual

[14] https://energy.ec.europa.eu/topics/renewable-energy/bioenergy/voluntary-schemes_en

pilot reports are also published for each of the ten pilots. An overview of the project deliverables is listed in Appendix A and all can be downloaded from the project website.[15]

Implementing the low ILUC-risk criteria through certification

They key elements that economic operators need to demonstrate for low ILUC-risk certification are:

1) To calculate a **'dynamic yield baseline'** to understand what the yield would have been without the additionality measure;

2) To identify and define an **'additionality measure'** to be taken. This could be a yield increase measure on existing land, or cultivation on unused, abandoned or severely degraded land;

3) To prove that the introduction of the additionality measure passes the **'additionality test'** by either passing a financial attractiveness test or barrier analysis. Note that yield increase projects conducted by independent small holders whose farm is smaller than 2 hectares, and cultivation on abandoned or severely degraded land, are exempt from the additionality test. In those situations, operators need to prove that the relevant situation applies in their case, according to the definitions in the Delegated Regulation 2019/807;

4) To calculate the volume of **'additional biomass'** that can be claimed as low ILUC-risk.Initially an estimate is needed for the management plan. After certification, the volume of low ILUC-risk biomass that can be claimed is the difference between the observed yield and the dynamic yield baseline.

The Low ILUC-risk certification guidance describes these steps in detail. Through the pilot projects, challenges with implementing these elements in practice were identified. Feedback and lessons learned from the pilots have been incorporated into the certification guidance to improve its robustness and user friendliness. Elements that auditors particularly need to pay attention to are described and highlighted. **Inherent challenges when implementing low ILUC-risk certification in practice**

A full list of challenges that were highlighted through the pilots is given in Table 4 at the end of chapter 3 of this report. Even with the lessons learned through the pilots, some inherent challenges remain when certifying low ILUC-risk projects, including:

- The pilot projects revealed **high natural variation in yields** at the individual farm level, caused by external factors, including weather. Whilst the dynamic yield baseline is calculated as an average of historical yields to smooth out some of that variation, factors such as weather are not explicitly controlled for under the methodology. In some cases, natural yield variation had a larger impact on biomass yields than the measures taken to increase yield. Yield variations due to external factors mean that the calculated quantity of additional biomass from a yield increase measure in a given year is not a precise characterisation of the 'real' impact of the additionality measure. Consequently, the low ILUC-risk methodology may systematically over- or underestimate the amount of additional material produced by a given project, as the impact of the additionality measure cannot be separated from the impact of the natural yield variances. Natural variation in yields will lead to

[15] https://iluc.guidehouse.com/

variation in the volume of low ILUC-risk biomass that can be claimed each year and this should be expected. However, as **yield is such a crucial indicator in low ILUC-risk certification, auditors should verify the accuracy of yield data very carefully.** Auditors need to check that yield data reported is accurate and can be linked back to the farm or plantation being certified. They should also ensure that outliers are discarded from the baseline calculation. After certification, for a party to remain low ILUC-risk certified, auditors need to check that additionality measures have been taken as described, to avoid low ILUC-risk claims being made simply because of naturally good years of yield without the economic operator having invested in the yield increase measure.

- For parties throughout the supply chain, **low ILUC material cannot be physically distinguished from non-low ILUC material. Therefore, robust implementation relies on thorough auditing of the mass balance system through the supply chain**. For yield increase measures, a single farm will, by definition, produce both low ILUC and non-low ILUC material, because the low ILUC claim can only be made for the additional biomass. For biomass produced on unused, abandoned or severely degraded land, that biomass will not necessarily be physically distinguishable from the same crop grown on existing agricultural land. The low ILUC-risk claim will be passed down the supply chain as one of the sustainability characteristics and auditors therefore need to be thorough in their checking of the mass balance system and volumes of low ILUC-risk claims passed down the supply chain, to ensure the claims made are robust.

Key observations from the pilot projects

For all of the pilot projects, the pilot participants found setting the dynamic yield baseline rather complex. Especially **applying the global trendline slope to the dynamic yield baseline** was often not clear to the pilot participants – both from the perspective of correctly applying the slope to calculate the baseline and from the perspective of understanding the justification for why a global trendline should be applied to their farm yields. The experience from the pilots showed that the global trendline generally makes only a small difference to the level of the baseline. Removing the slope would therefore not significantly impact the volumes of low ILUC-risk biomass and would simplify the methodology. The European Commission could consider removing the slope step from future updates to the legislation to reduce the administrative burden and the risk of mistakes in the calculation and verification. However, in the meantime as the concept of including a yield trendline in the baseline calculation is clearly set out in the Delegated Regulation and important to ensure that the mechanism only counts biomass that would not have otherwise been produced in a business as usual scenario. The certification guidance seeks to provide clear calculation steps and worked examples for operators on how to set the dynamic yield baseline, to ensure the methodology is clear and the steps can be easily followed. Auditors should be vigilant to check that calculations are conducted correctly using accurate yield data.

As an output from one of the palm pilots in particular, the certification guidance recommends to offer operators the option to determine the dynamic yield baseline and additional biomass on the basis of the raw material harvested (e.g. fresh fruit bunch) or on the basis of the usable intermediate product (e.g. total oil yield from the mill – crude palm oil plus palm kernel oil). The dynamic yield baseline and additional biomass calculation need to be on the same basis for a given economic operator and applied consistently over time.

For **intermediate crops** (also called sequential cropping in the pilot projects), high natural variations in yield and the fact that even simple crop rotation patterns lead to situations where the yields of different crops need to be compared, lead to the recommendation that

observed yield should not be the primary indicator to assess if intermediate crops "do not trigger demand for additional land" as there will always be some natural variations in yield. It is recommended that the growing season of the main crop is used as the main indicator to demonstrate whether the intermediate crop impacts the yield of the main crop. If the growing season of the main crop is unchanged after the introduction of the intermediate crop, then the whole yield of the intermediate crop should be counted. If the growing season of the main crop is changed, then any yield impact on the main crop as a result of the intermediate crop needs to be compensated in the volume of the intermediate crop that can be counted. When there are different crops involved in a rotation (e.g. wheat, rapeseed, sunflower etc), and one crop influences the yield of another, there can never be a perfect substitution or compensation. Different crops have different components (e.g. oils versus protein versus starch) and even within the same crop types, different oils or proteins for example have different properties and markets. Therefore **evaluating additional biomass based on energy content** is considered to offer the best basis for comparison as it offers a balance between conceptually compensating the energy content of the main crop that is lost and ease of calculation and applicability.

One of the main challenges to ensure robust low ILUC-risk certification is **ensuring that the additionality test is consistently applied**. There are two options to demonstrate additionality – the financial attractiveness test or barrier analysis.

The financial attractiveness test requires operators to demonstrate that the project would not have been financially attractive in the absence of low ILUC-risk certification. For this to work, it assumes that there will be a premium in the market for low ILUC-risk certified biomass. As currently defined, there is only a policy driver for high ILUC-risk feedstocks to become low ILUC-risk certified (which currently only applies to palm). Furthermore, that driver is rather weak as low ILUC-risk certified palm biofuel will still have to compete with biofuel from other crops within the food and feed cap. **A strong market signal will need to develop for low ILUC-risk certified biomass before any significant number of projects will be able to identify additionality using the financial attractiveness test.** Furthermore, there are many uncertainties in the value proposition from the low ILUC-risk mechanism currently, such as the volume of low ILUC-risk biomass that can be claimed each year, the market premium that will be available for low ILUC-risk fuels, and whether such a premium would be transferred up the supply chain to the feedstock producers who are investing in low ILUC practices. This hampers the attractiveness of the mechanism for economic operators. It is unrealistic to expect a farmer to make an investment that has a negative net present value (on paper) without a strong expectation of a return on that investment.

The alternative to the financial attractiveness test to demonstrate additionality is to prove that there are barriers to taking the additionality measure that are only overcome by the value signal from the EU biofuels market.[16] **The pilot projects found that the barrier analysis is inherently subjective and can be difficult to objectively prove. In practice, farmers make decisions by taking into consideration a range of drivers, in addition to the benefits of low ILUC risk claims, and it is hard to prove that low ILUC-risk certification is the decisive factor.** The absence of a clear value signal from the EU biofuels market will also limit the attractiveness of low ILUC-risk certification, and therefore the potential of the low ILUC-risk framework to allow operators to overcome the identified barriers. Whilst examples of barriers are given in the certification guidance, the decision as to whether a

[16] Delegated Regulation 2019/807, Article 5(1)(a) "Biofuels, bioliquids and biomass fuels may only be certified as low indirect land-use change-risk fuels if […] they become financially attractive or **face no barrier preventing their implementation** only because the biofuels, bioliquids and biomass fuels produced from the additional feedstock can be counted towards the targets for renewable energy under Directive 2009/28/EC or Directive (EU) 2018/2001"

project passes or not will be down to the opinion of the auditor and this remains somewhat subjective.

Ensuring a high level of **transparency** on how the additionality test is applied and audited will be crucial to the credibility of the low ILUC-risk mechanism, and to allow the market to learn and improve by implementing the mechanism in practice. The initial implementation years will provide further opportunities to continuously improve the practicality of the approach through feedback collected among auditors, certification bodies and voluntary schemes. It is recommended that voluntary schemes require auditors and certification bodies to share feedback, experience and recommendations regarding the applicability of the approach. Voluntary schemes can then report that information in a consolidated manner to the European Commission in their annual report so that the low ILUC-risk approach and guidance can be further improved at the European Commission level.

Annex VIII of Implementing Regulation 2022/996 states that **"**any barrier whose cost can be estimated shall be included in the financial attractiveness analysis." However, there are many barriers preventing farmers from optimising their yields and especially small farms do not always make decisions based purely on financial considerations. Therefore, **a more nuanced approach should be allowed, so that the financial attractiveness test should be used where costs can *reasonably* be estimated**. Especially small farms often face other challenges to access certification due to the cost and administration required. They will likely require an existing group manager or further gathering point to take the initiative and support the group through the process.

The low ILUC-risk certification approach should not encourage or reward an increased use of intensive agricultural practices at the expense of soil health. Implementing Regulation 2022/996 states "The additionality measure shall not compromise future growing potential by creating a trade-off between short-term output gains and mid/long-term deterioration of soil, water and air quality and pollinator populations." The low ILUC-risk module is designed to be used alongside existing EC-recognised voluntary schemes, many of which include broader sustainability requirements. However, for schemes that do not already cover these broader environmental criteria (soil, water, air and pollinators), **auditors should be especially vigilant to ensure that the additionality measures taken do not negatively impact the long-term sustainability of the land for agriculture. Furthermore, we recommend that the Commission requires recognised schemes that wish to extend their scope to certify low ILUC-risk explicitly add these broader sustainability criteria.**

Attractiveness of the low ILUC-risk mechanism

Overall, the **role of low ILUC-risk certification as a value signal in the current policy landscape can be considered rather modest, in comparison with other policy signals such as inclusion in Annex IX.** The policy mechanism only gives a value signal for high ILUC-risk feedstocks to become low ILUC-risk certified, and that value signal is considered to be rather weak as those feedstocks will compete with others within the food and feed cap. Only a limited number of farms are expected to be able to take yield increase measures that would increase their yield sufficiently to make low ILUC-risk certification worthwhile. The current methodology works best for larger market players who have sufficient resources to follow the detailed requirements of EU energy policy and to invest in sustainability certification and have robust and well documented data systems. However, these parties tend to already be frontrunners in terms of optimising their yield, thus leaving less potential for further yield increase.

Opportunities for low ILUC-risk certification for abandoned land, severely degraded land and intermediate crops

Whilst the role of low ILUC-risk biofuels is currently quite narrowly defined and the criteria in Delegated Regulation 2019/807 are very specific, the term "low ILUC biofuels" is often used more broadly by stakeholders, for example to describe yield increases of other non-high ILUC-risk feedstocks or any feedstocks grown on marginal or degraded lands. If there is a clear value signal from policy, there is an opportunity and interest to certify cultivation on abandoned or severely degraded land, and cultivation of intermediate crops.

Elements of the low ILUC-risk certification guidance developed in this project can be used to demonstrate additional biomass for these types of projects, for example, to support certification in the context of compliance with Annex IX (if those categories are added to the Annex). This could enhance the usefulness and attractiveness of the low ILUC approach, beyond just avoiding the high-ILUC risk crop phase out and could create a value signal for low ILUC-risk certification, which would drive project development and support the production of certifiable additional material.

For these opportunities to be realised, clear definitions and guidance is needed

Clear guidance and a consistent definition of **'intermediate crop'** is needed, which clarifies how additional biomass produced from intermediate crops can be demonstrated in practice for exemption from the food and feed cap and inclusion in Annex IX. The approach to calculating additional biomass can draw on the methodologies set out in the low ILUC-risk certification guidance. In the current policy landscape, calculating additional biomass from sequential cropping, as tested in the pilots, is primarily useful to identify additional biomass from intermediate crops that can be counted outside the REDII food and feed cap (because such crops are currently not high ILUC). Intermediate crops are also potentially proposed for inclusion in an extension of Annex IX feedstocks, and some sub-categories of intermediate crops are included within the definition of non-food cellulosic material in the current Annex IX. **The low ILUC-risk methodology to calculate additional biomass from sequential cropping could be used to demonstrate that intermediate crops do "not trigger demand for additional land", as is required by both the food and feed cap exemption and the proposed Annex IX definition.** It should also be explicitly clarified whether or not intermediate crops fitting the EC definition would have to pass the low ILUC-risk additionality requirements to be outside the food and feed cap or included in Annex IX. Further reflections and recommendations on the definition of intermediate crop is included in Appendix C.

Another area of significant interest is low ILUC-risk certification of biomass produced on abandoned or severely degraded land. **For abandoned land, the main challenge is finding examples where the land has been abandoned for more than 5 years (to meet the definition) but biofuels produced from biomass grown on that land can still meet the greenhouse gas (GHG) saving threshold required by the REDII once *direct* land use change emissions** are taken into account from the conversion of that land back into agriculture. For severely degraded land, the main feedback from stakeholders and the associated pilot project was that the proposed definitions were too extreme and little to no feedstock could be cultivated on land that meets those thresholds. Instead, it is therefore proposed **that the thresholds to define severely degraded land are set at a more modest level, but to counter that the farmer should either be required to prove there is no existing yield or to set a dynamic yield baseline in case that land is already under cultivation** (the yield baseline would be zero if the farmer can show that there is no cultivation currently on the land). Setting more modest degradation thresholds would allow land to be certified before it becomes so degraded that it is not possible to cultivate. **Clear and consistent definitions for severely degraded land should be set across all the**

potential policy applications in the REDII – low ILUC-risk certification, the GHG bonus for cultivation on severely degraded land and the potential inclusion in Annex IX.

Furthermore, the European Commission might consider **extending the validity of low ILUC-risk certification for severely degraded land for more than 10 years.** If re-certification of land after the initial 10-year certification period is dependent on the land still being degraded, this may lead to a perverse incentive for farmers to keep the land degraded. This could be avoided either by granting low-ILUC certification for severely degraded land for more than 10 years, or by explicitly requiring farmers on severely degraded land to take measures to improve the status of the soil. Additionally, a farmer looking to bring severely degraded land into cultivation might require several years to restore the land to the point where cultivation of crops is possible. Allowing for more than 10 years certification would give the farmer more security to undergo this time investment. The same argument could be made for abandoned land, depending on how long the agricultural land was previously abandoned and the current state of the plot.

Ensuring a smooth and robust roll out of low ILUC-risk certification

Low ILUC-risk certification is ready to be implemented by voluntary schemes. **There are several challenges identified that will need to be monitored by the voluntary schemes and the European Commission, especially in the early years to ensure robust implementation.** The mechanism will likely face external scrutiny and ensuring transparency and knowledge sharing on how it is applied and audited in practice will be crucial to build the credibility of the low ILUC-risk mechanism. The initial implementation years especially will provide opportunities to continuously improve the practicality of the approach through feedback collected among auditors, certification bodies and voluntary schemes.

Résumé exécutif

Ce rapport présente les résultats du **projet pilote de certification « Low ILUC risk » (faible risque de changement indirect d'affectation des sols)** [17]. Le projet vient en soutien de la Commission Européenne dans le **développement, la mise en œuvre et l'amélioration de la certification « Low ILUC risk »**, dont les critères sont décrits dans le Règlement Délégué 2019/807[18]. Le deuxième objectif de ce projet est de réviser **les aspects importants de la certification « Low ILUC risk »** tels que décrits dans le rapport « feedstock expansion »[19] qui accompagne le Règlement Délégué.

L'équipe projet est menée par Guidehouse, avec le soutien de ISCC (International Sustainability & Carbon Certification), Control Union, E4tech (ERM Group), Cerulogy et l'IEEP (Institute for European Environmental Policy). Le projet a été menée en deux phases entre 2020 et 2023. Les résultats de la première phase ont été directement utilisés dans l'Annexe VIII du Règlement d'Exécution 2022/996 du 14 juin 2022 à destination des systèmes de certification volontaires[20]. Les résultats de la deuxième phase incluent des recommandations à destination de la Commission Européenne pour améliorer la certification « Low ILUC risk » dans les réglementations à venir, ce qui inclut notamment le rapport « feedstock expansion » révisé et la Directive (révisée) sur les énergies renouvelables EU/2023/2413 (EU RED III).

Que sont les biocarburants à faible risque de changement indirect d'affectation des sols (« Low ILUC risk ») ?

Le changement indirect d'affectation des sols (« indirect land-use change » ou ILUC en anglais) se produit quand une demande supplémentaire en terre arable pour la production de biocarburants, de bioliquides ou de combustibles issus de la biomasse entraine une expansion agricole sur des sols utilisés pour d'autres usages. Si cette expansion a pour résultat une réduction nette des stocks de carbone dans la biomasse et les sols (par exemple, en convertissant des zones qui stockent des taux élevés de carbone tels que les forêts ou les prairies en terre agricole), les gains d'émissions de gaz à effet de serre que procurent les biocarburants peuvent être en partie ou complètement perdus. Le Règlement Délégué 2019/807 présente les **critères détaillés pour définir des matières premières à haut risque de changement indirect d'affectation des sols** (« High ILUC risk »), qui sont celles pour lesquelles on observe une expansion significative des zones de production sur des terres qui stockent des taux élevés de carbone. Dans la Directive (Refonte) sur les Energies Renouvelables 2018/2001 (RED II), les Etats Membres doivent limiter l'usage de **biocarburants à haut risque** (« High ILUC risk ») au niveau de 2019 et les abandonner progressivement d'ici 2030, à moins que ces derniers soient **certifiés « Low ILUC risk ».** La certification « Low ILUC risk » offre donc une **opportunité aux opérateurs économiques d'éviter de devoir cesser de produire ou utiliser des matières premières ou des biocarburants à haut risque.**

Un élément central de la certification « Low ILUC risk » est la démonstration d'une production de « **biomasse additionnelle** » grâce au concept de **« mesure d'additionnalité ».** Cela peut être une mesure d'augmentation des rendements sur une exploitation existante ou l'utilisation de terres non-utilisées, abandonnées ou sévèrement

[17] "Mitigating ILUC: Pilots and Review", contract number ENER/C2/2018-462 Lot 2

[18] Règlement Délégué (UE) 2019/807 de la Commission du 13 mars 2019: https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=uriserv:OJ.L_.2019.133.01.0001.01.ENG

[19] Commission Européenne COM(2019)142, 13 March 2019 https://eur-lex.europa.eu/legal-content/en/TXT/?uri=CELEX%3A52019DC0142

[20] Règlement d'Exécution (UE) 2022/996 de la Commission du 14 Juin 2022: https://eur-lex.europa.eu/legal-content/FR/TXT/PDF/?uri=CELEX:32022R0996

dégradées. Ainsi, l'opérateur économique démontre qu'une quantité supplémentaire de biomasse est produite, ce qui évite une expansion de la production agricole (notamment pour la production de nourriture et de fourrage) sur de nouvelles terres[21]. En conséquence, des biocarburants utilisant des matières premières comestibles ne déplacent pas la production alimentaire ou fourragère, mais sont produits à partir de matière première supplémentaire, par rapport aux niveaux existants.

L'objectif de ce projet est de transposer les critères « Low ILUC risk » sous forme d'un **guide de certification** pouvant être utilisé par tout système de certification reconnu par la Commission Européenne[22] pour mettre en place un module de certification « low ILUC risk » pour les biocarburants, de bioliquides ou de combustibles issus de la biomasse, évitant ainsi les restrictions mentionnées ci-dessus concernant les matières premières à haut risque.

Développement et test du Guide de Certification « Low ILUC risk »

Le guide de certification « Low ILUC risk » développé dans le cadre de ce projet peut être déployé par tout système de certification reconnu par la Commission Européenne, à la condition que cette dernière approuve l'extension du champ d'application du système aux biocarburants « low ILUC risk ». Le guide de certification a été structuré pour s'adapter à tout type de matière première, quelle que soit l'échelle de production et la région. Il décrit également comment minimiser les démarches administratives en alignant un module "low ILUC risk" avec les procédures de certification en groupe.

La praticité, l'accessibilité et la robustesse du guide de certification ont été testés et améliorés dans le cadre de **10 projets pilotes agricole** (cinq dans chaque phase du projet). La **Figure 2** ci-dessous donne une vue géographique des 10 projets pilotes, qui couvrent des fermes et des plantations dans trois régions (Europe, Asie du Sud-Est et Amérique Latine), plusieurs types de plantes (plantes à huile et plantes à amidon) et différents types de mesures d'additionnalité. Les mesures mises en œuvre dans les projets pilotes incluent l'augmentation des rendements sur des fermes ou plantations existantes, l'introduction de cultures séquentielles (pour obtenir une récolte supplémentaire, également appelée culture intermédiaire), ainsi que la culture sur des terres abandonnées ou sévèrement dégradées.

[21] L'article 2(6) du Règlement Délégué 2019/807 Article 2(6) définit la biomass additionnelle comme la quantité supplémentaire de plante à usage alimentaire/fourrager dans une zone clairement délimitée, en comparaison d'un rendement de base, et qui résulte directement de l'application d'une mesure d'additionnalité.

[22] https://energy.ec.europa.eu/topics/renewable-energy/bioenergy/voluntary-schemes_en

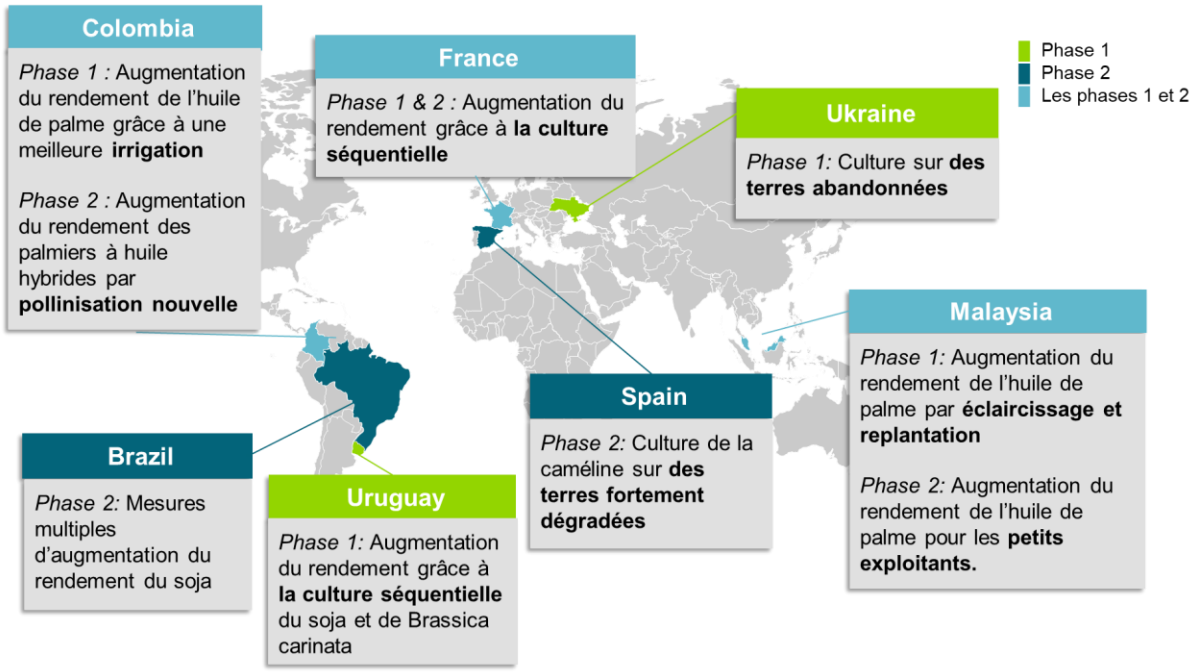

Figure 2. Carte des projets pilotes

Parallèlement au guide de certification, l'équipe de projet a élaboré une checklist pour les auditeurs et un plan de gestion, qui ont été testés dans les projets pilotes par des auditeurs professionnels et peuvent être adoptés par des systèmes de certification reconnus par la Commission et souhaitant délivrer une certification « low ILUC ». Des rapports individuels de sont également publiés pour chacun des dix projets pilotes. Un aperçu des livrables du projet figure à l'annexe A et tous peuvent être téléchargés à partir du site Web du projet[23].

Mise en œuvre des critères « low ILUC risk » via la certification

Les éléments clés que les opérateurs économiques doivent démontrer pour obtenir une certification « low ILUC risk » incluent :

1) Calculer une « **base de référence dynamique du rendement** » pour comprendre ce que le rendement aurait été sans la mesure d'additionnalité ;

2) Déterminer et définir une « **mesure d'additionnalité** » à prendre. Il pourrait s'agir d'une mesure d'augmentation du rendement sur les terres existantes ou de culture sur des terres inutilisées, abandonnées ou sévèrement dégradées ;

3) Prouver que l'introduction de la mesure d'additionnalité réussit le « test d'additionnalité », soit suivant un test d'attractivité financière, soit suivant une analyse des barrières. Il convient de noter que les projets d'augmentation du rendement menés par des petits exploitants indépendants (moins de 2 hectares) et les cultures sur des terres abandonnées ou sévèrement dégradées sont exemptés du test d'additionnalité. Dans ce cas, les opérateurs doivent prouver que l'approche est applicable à leur cas, conformément aux définitions du Règlement Délégué 2019/807 ;

4) Pour calculer le volume de « biomasse supplémentaire » qui peut être considéré comme présentant un faible risque d'ILUC, il faut d'abord une estimation pour le plan

[23] https://iluc.guidehouse.com/

de gestion. Après certification, le volume de biomasse à faible risque ILUC qui peut être revendiqué est la différence entre le rendement observé et la référence de rendement dynamique.

Le guide de certification « low ILUC risk » décrit ces étapes en détail. Dans le cadre des projets pilotes, les difficultés liées à la mise en œuvre pratique de ces éléments ont été identifiées. Les retours des différents acteurs impliquées et les leçons tirées des projets pilotes ont été intégrés au guide de certification afin d'en améliorer la robustesse et la lisibilité. Les éléments auxquels les auditeurs doivent particulièrement prêter attention sont également décrits dans le guide.

Défis inhérents dans la mise en œuvre pratique de la certification « Low ILUC risk »

Le tableau 4 (Table 4) à la fin du chapitre 3 du présent rapport présente une liste complète des défis qui ont été relevés dans le cadre des projets pilotes. Même avec les leçons tirées des projets pilotes, certains défis inhérents subsistent lors de la certification de projets à faible risque, notamment :

- Les projets pilotes ont révélé une **forte variation naturelle des rendements** au niveau de chaque exploitation, causée par des facteurs externes, notamment les conditions météorologiques. Alors que la base de référence du rendement dynamique est calculée comme une moyenne des rendements historiques pour atténuer une partie de cette variation, des facteurs tels que les conditions météorologiques ne sont pas explicitement contrôlés dans le cadre de la méthodologie. Dans certains cas, la variation naturelle du rendement a eu un impact plus important sur le rendement de la biomasse que les mesures prises pour augmenter le rendement. Les variations de rendement dues à des facteurs externes signifient que la quantité calculée de biomasse supplémentaire à partir d'une mesure d'augmentation de rendement au cours d'une année donnée n'est pas une caractérisation précise de l'impact « réel » de la mesure d'additionnalité. Par conséquent, la méthodologie « low ILUC risk » pourrait tendre à systématiquement surestimer ou sous-estimer la quantité de matériel supplémentaire produite pour un projet donné, dans la mesure où l'impact de la mesure d'additionnalité ne peut être séparé de l'impact des variations naturelles de rendement. Ce phénomène est dû à l'augmentation du rendement due aux conditions météorologiques comme si elle était une augmentation du rendement due à une mesure d'additionnalité. Cet effet peut également fonctionner dans la direction opposée si le rendement de base est établi au cours d'années comportant une météo favorable. La variation naturelle des rendements entraîne également une variation du volume de biomasse à faible risque (ILUC) pouvant être revendiquée chaque année, ce qui est prévisible. Cependant, **comme le rendement est un indicateur crucial dans la certification « Low ILUC risk », les auditeurs doivent vérifier très soigneusement l'exactitude des données sur le rendement**. Les auditeurs doivent vérifier que les données de rendement déclarées sont exactes et peuvent être pratiquement reliées à la ferme ou à la plantation certifiée. Ils doivent également s'assurer que les valeurs excentriques de rendement sont écartées du calcul de base. Afin de maintenir la certification « low ILUC Risk » ainsi obtenue, les auditeurs doivent vérifier que des mesures d'additionnalité ont été mises en œuvre conformément à ce qui avait été planifié. Cela permet d'éviter que des allégations de faibles risques de changement indirect d'affectation des sols (ILUC) ne se fondent que sur des années de rendement naturellement supérieurs à la moyenne sans que l'opérateur économique ait investi dans la mesure d'augmentation du rendement.

- Pour les opérateurs économiques situés tout au long de la chaîne d'approvisionnement, **un certain type de biomasse à faible risque (ILUC) ne peuvent pas être distinguées physiquement du même type de biomasse obtenue sans mesure « low ILUC risk ». Par conséquent, une mise en œuvre robuste du concept de certification « low ILUC risk » repose largement sur un audit approfondi du système de bilan massique à travers la chaîne d'approvisionnement**. Pour les mesures d'augmentation du rendement, une ferme individuelle produira, par définition, à la fois de la biomasse à faible risque de ILUC et de la biomasse ne remplissant pas les critères « low ILUC risque », étant donné que les allégations de production de biomasse « low ILUC risk » ne sont permises que si les rendements dépassent la valeur de base. Pour la biomasse produite sur des terres inutilisées, abandonnées ou sévèrement dégradées, cette biomasse ne pourra pas nécessairement être physiquement distinguée de la même plante cultivée sur des terres arables. Les allégations « low ILUC risk » seront transmises le long de la chaine de valeur comme l'une des caractéristiques de durabilité à inclure dans la documentation. Les auditeurs doivent donc être minutieux dans leur contrôle du système de bilan massique et des volumes étiquetés « low ILUC risk » transmis le long de la chaîne de valeur, afin de s'assurer que les allégations soient valides et légitimes.

Principales observations des projets pilotes

Pour tous les projets pilotes, les participants ont trouvé plutôt complexe la définition d'une référence de rendement dynamique. En particulier, l'application de la pente de tendance globale du rendement (« global trendline ») à la **ligne de référence dynamique du rendement** (« dynamic yield baseline ») n'était souvent pas claire pour les participants. C'est autant le cas du point de vue de l'application correcte de la pente pour calculer rendement de base que du point de vue de comprendre la raison pour laquelle une ligne de tendance mondiale devrait être appliquée aux rendements agricoles. L'expérience des pilotes a montré que la courbe de tendance globale (rendement) ne fait généralement qu'une petite différence par rapport au niveau de la ligne de rendement de base. L'élimination de la pente n'aurait donc vraisemblablement pas d'impact significatif sur les volumes de biomasse à faible risque (ILUC) et aurait pour avantage de simplifier considérablement la méthodologie. La Commission Européenne pourrait donc envisager de supprimer la prise en considération de la pente dans les futures mises à jour de la législation afin de réduire la charge administrative et le risque d'erreurs dans le calcul et la vérification du rendement de base et de l'augmentation des rendements. Cependant, l'intégration de la ligne de tendance du rendement dans le calcul de base étant clairement énoncé dans le Règlement Délégué, il est important de s'assurer que le mécanisme ne compte que la biomasse qui n'aurait pas été produite si la mesure n'avait pas été mise en œuvre. Le guide de certification vise à expliciter les étapes de calcul et les exemples pratiques pour les exploitants, afin de garantir que la méthodologie est claire et que les étapes peuvent être facilement suivies. Les auditeurs doivent être vigilants pour vérifier que les calculs sont effectués correctement en utilisant des données de rendement valides.

Le guide de certification recommande également d'offrir aux exploitants la possibilité de déterminer le rendement dynamique de base et la biomasse supplémentaire en fonction de la matière première récoltée (p. ex. grappe de fruits frais dans le cas du palmier) ou du produit intermédiaire (p. ex., rendement total de l'huile provenant de l'usine – huile de palme brute et huile de palmiste). Le rendement dynamique de base et les volumes de biomasse supplémentaire doivent être calculés sur la même base pour un opérateur économique donné et appliqués de manière cohérente dans le temps.

Pour les **cultures intermédiaires** (également appelées cultures séquentielles dans les projets pilotes), des variations élevées du rendement naturel et le fait que même de simples schémas de rotation des cultures conduisent à des situations où les rendements de différentes cultures doivent être comparés, amènent à recommander que le **rendement observé ne soit pas le principal indicateur pour évaluer si les cultures intermédiaires « ne déclenchent pas la demande de terres supplémentaires »**. Il est recommandé d'utiliser la saison de croissance de la culture principale comme principal indicateur pour démontrer si la culture intermédiaire a une incidence sur le rendement de la culture principale. Si la période de croissance de la culture principale est inchangée après l'introduction de la culture intermédiaire, alors le rendement de la culture intermédiaire doit être entièrement compté. Si la période de croissance de la culture principale est modifiée, tout impact sur le rendement de la culture principale résultant de la culture intermédiaire doit être compensée en déduisant le volume de biomasse issu de la culture intermédiaire. Lorsqu'une rotation comprend plusieurs cultures (p. ex., blé, colza, tournesol, etc.) et qu'une culture influence le rendement d'une autre, il ne peut jamais y avoir de substitution ou de compensation parfaite. Les différentes cultures ont des composants différents (p. ex., les huiles par rapport aux protéines par rapport à l'amidon) et même au sein de certains types de plantes, la biomasse (par ex. huiles ou protéines) peut avoir des propriétés et des marchés différents. Par conséquent, l'évaluation de la biomasse supplémentaire basée sur la teneur en énergie (plutôt que la masse ou le volume seuls) est considérée comme une meilleure base de comparaison. En effet, elle offre un équilibre entre une approche conceptuelle de la compensation de la perte en teneur énergétique de la culture principale perdue et la facilité de calcul et son applicabilité.

L'un des principaux défis pour garantir une certification « low ILUC risk » robuste est de **s'assurer que le test d'additionnalité est appliqué de manière cohérente et constante**. Il existe deux options pour démontrer l'additionnalité d'une mesure : le test d'attractivité financière ou l'analyse des barrières.

Le test d'attractivité financière exige que les opérateurs économiques démontrent que le projet n'aurait pas été financièrement attrayant en l'absence d'une certification « low ILUC risk ». Tel que défini actuellement, la seule incitation à utiliser la certification « low ILUC risk » ne concerne que les matières premières classées comme étant à risque élevé. Ce qui ne concerne que les produits issus du palmier à huile pour l'instant. Cette incitation est plutôt faible car des biocarburants « low ILUC risk » se retrouveraient en concurrence avec d'autres biocarburants issus de plantes comestibles dans le cadre de l'abandon progressif (« phase-out ») de ces matières premières, réduisant progressivement la demande. **Un signal fort du marché est donc nécessaire en faveur de la biomasse certifiée « low ILUC risk » afin qu'un nombre significatif de projets soit en mesure de démontrer l'additionnalité des mesures par le test d'attractivité financière.** En outre, il existe de nombreuses incertitudes concernant la valeur ajoutée de la certification « Low ILUC risk », telles que le volume de biomasse « low ILUC risk» pouvant être déclarée chaque année, la marge supplémentaire applicable au prix du marché pour les biocarburants certifiés « low ILUC risk », et si une telle marge pourrait être transférée en amont de la chaine de valeur afin de profiter aux exploitants ayant investi dans les mesures d'additionnalité. La situation actuelle est défavorable pour l'attractivité de la certification « Low ILUC » et il est irréaliste d'espérer qu'un exploitant choisira d'investir dans des mesures ayant une valeur actuelle nette (virtuelle) négative sans attendre un retour significatif sur investissement.

L'alternative au test d'attractivité financière pour démontrer l'additionnalité est de prouver qu'il existe des barrières à l'adoption de la mesure d'additionnalité, et qui ne seraient surmontées que si un signal du marché des biocarburants dans l'UE venait rendre la mesure

attractive[24]. **Les projets pilotes ont révélé que l'analyse des barrières est intrinsèquement subjective et peut donc être difficile à prouver objectivement. En pratique, les agriculteurs prennent des décisions en tenant compte d'un éventail de facteurs, qui s'ajoutent aux avantages liés aux allégations de faible risque de changement indirect d'affectation des sols. Il est donc difficile de prouver que la certification « Low ILUC risk » à faible risque ILUC est le facteur décisif pour la mise en œuvre de la mesure.** L'absence d'un signal de valeur clair du marché des biocarburants dans l'UE limitera également l'attrait de la certification « low ILUC risk », et donc son potentiel de permettre aux opérateurs de surmonter les barrières identifiées. Bien que des exemples de barrières soient donnés dans le guide de certification, le résultat de l'analyse des barrières dépendra en partie de l'opinion de l'auditeur et reste donc subjective.

Assurer un niveau élevé de **transparence** sur la façon dont le test d'additionnalité est appliqué et audité sera crucial pour la crédibilité de la certification « Low ILUC risk » et pour la capacité du marché à apprendre et à s'améliorer grâce à sa mise en pratique. Les premières années de mise en œuvre offriront d'autres occasions d'améliorer continuellement l'aspect pratique de l'approche grâce aux commentaires recueillis auprès des auditeurs, des organismes de certification et des systèmes de certification volontaires. Il est recommandé aux systèmes de certification de demander aux auditeurs et aux organismes de certification de partager leurs retours d'expérience et leurs recommandations pour améliorer l'applicabilité de l'approche « Low ILUC risk ». Les systèmes de certification pourront ensuite communiquer ces informations de manière consolidée à la Commission européenne dans leur rapport annuel afin que l'approche et le guide de certification « low ILUC risk » puissent être encore améliorés par la Commission européenne.

L'annexe VIII du Règlement d'Exécution 2022/996 stipule que « toute barrière dont le coût peut être estimé doit être incluse dans l'analyse de l'attractivité financière ». Cependant, de nombreux obstacles empêchent les agriculteurs d'optimiser leurs rendements, en particulier pour les petites exploitations qui ne basent par leurs décisions sur des aspects uniquement financiers. Par conséquent, **le guide de certification devrait permettre une approche plus flexible en indiquant que le test d'attractivité financière ne devrait être utilisé que lorsque les coûts peuvent être raisonnablement estimés.** Les petites exploitations, en particulier, font souvent face à d'autres défis pour accéder à la certification en raison des coûts et des démarches administratives requis. Ils auront probablement besoin qu'un gestionnaire de groupe ou d'un collecteur de biomasse prenne l'initiative et soutienne le groupe de petits exploitants tout au long du processus.

L'approche de certification « Low ILUC risk » ne devrait pas encourager ou récompenser les pratiques agricoles intensives au détriment de la santé des sols. Le règlement d'exécution 2022/996 stipule que « la mesure d'additionnalité ne doit pas compromettre le potentiel de cultivation futur en obtenant des gains de production à court terme au détriment de la qualité du sol, de l'eau et de l'air et des populations de pollinisateurs moyen/long terme. » Le module « low ILUC risk » est conçu pour venir renforcer les systèmes de certification reconnus par la CE, dont beaucoup comprennent des exigences plus larges en matière de durabilité, ce qui réduirait un tel risque. Toutefois, pour les systèmes de certification qui ne couvrent pas déjà ces critères environnementaux plus larges (sol, eau, air et pollinisateurs), **les auditeurs devront être particulièrement vigilants pour s'assurer que les mesures d'additionnalité prises n'ont pas d'impact négatif sur la durabilité des terres pour**

[24] Delegated Regulation 2019/807, Article 5(1)(a) "Biofuels, bioliquids and biomass fuels may only be certified as low indirect land-use change-risk fuels if […] they become financially attractive or **face no barrier preventing their implementation** only because the biofuels, bioliquids and biomass fuels produced from the additional feedstock can be counted towards the targets for renewable energy under Directive 2009/28/EC or Directive (EU) 2018/2001"

l'agriculture. En outre, nous recommandons que la Commission exige que les systèmes de certification approuvés et souhaitant étendre leur champ d'application pour délivrer la certification « Low ILUC risk » ajoutent systématiquement des critères de durabilité supplémentaires permettant de minimiser ces risques.

Attractivité du mécanisme « Low ILUC risk »

De manière générale, la valeur ajoutée de la certification « Low ILUC risk » au sein de la réglementation européenne reste limitée, en comparaison d'autres mesures telles qu'une inclusion dans l'Annexe IX de la Directive sur les Energies Renouvelables. Seules les matières premières étiquetées « High ILUC risk » ont un intérêt réel à recevoir une certification « Low ILUC risk », même si cet intérêt reste limité en raison des motifs expliqués précédemment (concurrence avec les autres matières premières comestibles). Il est donc prévisible que seul un nombre limité d'exploitations devrait être en capacité de mettre en œuvre des mesures qui permettraient d'augmenter leur rendement à un niveau qui rendrait l'investissement dans la certification « Low ILUC risk» rentable. Aussi, la méthodologie actuelle fonctionne mieux pour les grands opérateurs économiques disposant de ressources suffisantes pour suivre les exigences détaillées de la réglementation européenne, investir dans la certification durable, et qui disposent de systèmes de données solides et bien documentés. Cependant, ces parties ont tendance à être déjà à la pointe des mesures d'optimisation du rendement, rendant ainsi de nouvelles augmentations du rendement plus difficile à obtenir.

Opportunités de la certification « Low ILUC risk » pour la biomasse obtenue de terres abandonnées, sévèrement dégradées ou de cultures intermédiaires

Alors que le rôle des biocarburants certifiés « low ILUC risk » est actuellement assez étroitement défini et que les critères du règlement délégué 2019/807 sont très spécifiques, le terme « low ILUC biofuels» (biocarburants à faible risque de changement indirect d'affectation des sols) est souvent utilisé plus largement par les parties prenantes. Par exemple les augmentations de rendement de matières premières n'étant pas à risque élevé ou de la biomasse cultivée sur des terres marginales ou dégradées. Une opportunité et un intérêt pour certifier la culture sur des terres abandonnées ou gravement dégradées, et les cultures intermédiaires devrait être émis par le régulateur européen.

Les éléments du guide de certification à faible risque ILUC élaboré dans le cadre de ce projet peuvent être utilisés pour démontrer la biomasse additionnelle obtenue dans ce type de projets, par exemple, dans le contexte de la conformité à l'Annexe IX (si ces catégories de biomasse sont ajoutées à l'annexe). Cela pourrait accroître l'utilité et l'attrait de l'approche « low ILUC risk », au-delà du simple fait d'éviter l'élimination progressive des types de biomasse « high ILUC risk» et pourrait créer une incitation favorable envers la certification « low ILUC risk ». Cela stimulerait le développement de projets et soutiendrait la production supplémentaire de biomasse/biocarburant certifiable.

Afin que ces opportunités se matérialisent, des définitions et des instructions claires sont nécessaires

Des recommandations claires et une définition cohérente de la « **culture intermédiaire** » sont nécessaires. Cela permettrait de clarifier la façon dont la biomasse additionnelle produite à partir de cultures intermédiaires peut être pratiquement démontrée pour obtenir une exemption du plafond applicable aux denrées alimentaires et fourragères, et/ou son inclusion à l'Annexe IX. L'approche de calcul de la biomasse additionnelle peut s'appuyer sur le guide de certification « low ILUC risk ». Dans la réglementation actuelle, le calcul de la biomasse additionnelle à partir de cultures séquentielles, tel que testé dans les projets pilotes, est avant tout utile pour la biomasse issue de cultures intermédiaires exemptées du

plafond REDII pour l'alimentation humaine et animale (car ces cultures ne sont actuellement pas considérées « high ILUC risk »). L'ensemble des cultures intermédiaires pourraient également être incluses à l'Annexe IX, certaines sous-catégories de cultures intermédiaires pouvant déjà être considérées comme incluses dans sa version actuelle comme matières cellulosiques non alimentaires. **La méthode « low ILUC risk » pour calculer la biomasse additionnelle à partir de cultures séquentielles pourrait être utilisée pour démontrer que les cultures intermédiaires ne « déclenchent pas de demande de terres supplémentaires », comme l'exige l'exemption du plafond pour les denrées alimentaires et fourragères et la définition proposée de l'Annexe IX.** Il convient également de clarifier explicitement si les cultures intermédiaires répondant à la définition communautaire devraient satisfaire aux exigences d'additionnalité de l'approche « low ILUC risk » pour rester en dehors du plafond applicable aux denrées alimentaires et fourragères ou pour être incluses dans l'Annexe IX. Des considérations supplémentaires sont incluses dans l'appendice D de ce rapport (Appendix C)

Un autre domaine d'intérêt important est la certification « low ILUC risk » de la biomasse produite sur des terres abandonnées ou sévèrement dégradées. **Le principal défi est de trouver des exemples où les terres ont été abandonnées pendant plus de 5 ans (pour être conforme à leur définition) mais dont les biocarburants issus de ces terres restent en conformité avec le seuil de réduction des gaz à effet de serre (GES) exigé dans la RED II, une fois prises en compte les émissions liées au changement direct d'affectation du sol vers une utilisation agricole.** Pour les terres sévèrement dégradées, les principaux commentaires en provenance des projets pilotes étaient que les définitions proposées étaient trop strictes, rendant peu de matières premières cultivées sur ces terres éligibles. **Il est donc proposé que les seuils pour définir les terres sévèrement dégradées soient fixés à un niveau plus modeste. En retour, l'exploitant devrait soit être tenu de prouver qu'il n'y a pas de rendement existant, soit d'établir une base de rendement dynamique si la terre est déjà en culture (la base de rendement serait nulle si l'agriculteur peut démontrer qu'il n'y a pas de culture actuellement sur la terre).** L'établissement de seuils de dégradation plus modestes permettrait de certifier les terres avant qu'elles ne soient tellement dégradées qu'il deviendrait impossible de les cultiver. **Des définitions claires et cohérentes des terres sévèrement dégradées devraient donc être établies pour toutes les applications réglementaires liées à la Directive sur les Energies Renouvelables (REDII)** : certification « low ILUC risk », bonus de GES pour la culture sur des terres gravement dégradées et inclusion potentielle dans l'Annexe IX.

De plus, la Commission européenne pourrait envisager **d'étendre la validité de la certification « low ILUC risk » aux terres ayant été sévèrement dégradées pendant plus de 10 ans.** La re-certification des terres après la période initiale de certification de 10 ans nécessitant que les terres restent sévèrement dégradées, on pourrait ainsi créer une incitation à maintenir la dégradation des terres. Afin d'éviter un tel effet, on pourrait accorder une certification « Low ILUC » aux utilisateurs de terres sévèrement dégradées pendant plus de 10 ans à la condition qu'ils prennent des mesures pour améliorer l'état des sols. En outre, un agriculteur qui cherche à mettre en culture des terres sévèrement dégradées pourrait avoir besoin de plusieurs années pour restaurer la terre à un niveau rendant la culture possible. Le fait de permettre une certification de plus de 10 ans donnerait à l'agriculteur plus de sécurité pour amortir cet investissement de temps. Le même argument pourrait être avancé pour les terres abandonnées, selon la durée de l'abandon des terres agricoles et l'état actuel de la parcelle.

Assurer un déploiement fluide et robuste d'une certification « Low ILUC risk »

La certification « Low ILUC risk » est prête à être mise en œuvre par des systèmes de certification volontaires. **Plusieurs défis identifiés au cours de ce projet devraient faire**

l'objet d'un suivi par les systèmes de certification et la Commission Européenne, en particulier au cours des premières années, pour assurer une mise en œuvre robuste. Le mécanisme sera vraisemblablement scruté par des acteurs externes à la Commission Européenne et il sera donc crucial d'assurer la transparence et le partage des connaissances sur la façon dont il est appliqué et audité dans la pratique, ce afin de renforcer la crédibilité du mécanisme à faible risque ILUC. Les premières années de mise en œuvre offriront également la possibilité d'améliorer continuellement l'aspect pratique de l'approche grâce aux commentaires recueillis auprès des auditeurs, des organismes de certification et des systèmes de certification volontaires.

1. Introduction

1.1 Objective and scope of the report

This report sets out the findings of the project "**Mitigating ILUC: Pilots and Review (ENER/C2/2018-462 – Lot 2)**". The project supports the work of the European Commission to implement the provisions on indirect land-use change (ILUC), by **testing the applicability of the methodology to certify low ILUC-risk biofuels, bioliquids and biomass fuels**, as specified in the Renewable Energy Directive (EU) 2018/2001 (REDII) and the Delegated Regulation 2019/807.[25] The project team is led by Guidehouse, supported by voluntary scheme ISCC (International Sustainability & Carbon Certification), certification body Control Union, and a team from E4tech, Cerulogy and IEEP (Institute for European Environmental Policy).

The project covers the development and implementation of low ILUC-risk pilot projects and a review of the relevant aspects of the feedstock expansion report[26] that accompanies the Delegated Regulation 2019/807. The project is Lot 2 of a larger piece of work on ILUC for the European Commission, Lot 1 of which aims to review section III of the feedstock expansion report, which is used to determine high ILUC-risk feedstocks.[27]

This project (Lot 2) **aims to test all aspects of the methodology to certify low ILUC-risk biofuels**. A Low ILUC-risk **certification module** has been developed[28], which is intended to be used as an "add-on" module alongside existing EC-recognised voluntary schemes to certify low ILUC-risk biofuels, bioliquids or biomass fuels. The certification module has been tested and further refined through **ten agricultural pilot projects**. The pilot projects cover farms and plantations in three different geographical regions (Europe, South-East Asia and Latin America), different types of crops (oil crops and starch crops) and different types of "additionality measure". The term additionality measure describes a way to sustainably produce additional biomass in the context of low ILUC-risk certification. The pilot projects covered a range of additionality measure types, including measures to increase yields on existing farms or plantations, the introduction of sequential cropping to produce an additional crop on an existing farm, and new cultivation on abandoned or severely degraded land. Detailed results for each pilot can be found in the individual pilot reports which are published separately as part of this project.

This report is the final report of the project and sets out an overview of the project approach and the review of the different elements required for low ILUC-risk certification, and the applicability of low ILUC-risk certification in different contexts, based on the pilot findings and stakeholder feedback. Key challenges associated with low ILUC-risk certification and policy recommendations to the Commission are also described. The report serves as input to the

[25] Commission Delegated Regulation (EU) 2019/807 of 13 March 2019 supplementing Directive (EU) 2018/2001 of the European Parliament and of the Council as regards the determination of high indirect land-use change-risk feedstock for which a significant expansion of the production area into land with high carbon stock is observed and the certification of low indirect land-use change-risk biofuels, bioliquids and biomass fuels. https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=uriserv:OJ.L_.2019.133.01.0001.01.ENG

[26] European Commission COM(2019)142, 13.3.2019. Report from the Commission to the European Parliament, The Council, The European Economic and Social Committee and the Committee of the Regions on the status of production expansion of relevant food and feed crops worldwide. https://eur-lex.europa.eu/legal-content/en/TXT/?uri=CELEX%3A52019DC0142

[27] Further information on both Lot 1 and Lot 2 projects is published on a dedicated project website here: https://iluc.guidehouse.com/

[28] Note that a draft low ILUC-risk certification guidance was developed for the Commission by Navigant (now Guidehouse) and IEEP in a parallel project under the voluntary scheme assessment Framework Service Contract ENER/C1/2018-513. That draft guidance formed the foundation for the certification documents developed and piloted in this project.

Commission's review of Delegated Regulation 2019/807 and section IV of the feedstock expansion report which relates to low ILUC-risk certification.

1.2 Reading guide

- Chapter 2 of this report describes the overall project approach and timeline and gives an overview of the ten pilot projects.
- Chapter 3 analyses the different elements required for low ILUC-risk certification, based on the pilot findings and stakeholder feedback. It also includes an overview of the key challenges related to low ILUC-risk certification that auditors should be mindful of when certifying low ILUC-risk projects, based on the pilots.
- Chapter 4 reflects on the applicability of low ILUC-risk certification in different contexts.
- Chapter 5 describes policy recommendations for the Commission related to the implementation of low ILUC-risk certification in the current policy context.
- Appendices to the report include:
    - A: List of accompanying project deliverables
    - B: Overview of updates to the final Low ILUC certification guidance, as compared to the 2022 version of the guidance published for public consultation
    - C: Reflection on the potential role for elements of low ILUC-risk certification for intermediate crops.
    - D: Examples of severely degraded land

1.3 Policy background

Sustainability criteria are set for the use of biofuels in the EU transport sector. Biofuels need to comply with these sustainability criteria to be counted towards national and EU renewables targets and to qualify for public support schemes. Criteria were introduced as part of the first Renewable Energy Directive (Directive 2009/28) and have contributed towards limiting the risk of *direct land-use change impacts* associated with the production of conventional biofuels and bioliquids, but they do not address *indirect land-use change impacts*.

Indirect land-use change (ILUC) occurs when the additional demand for land to produce biofuels leads to the expansion of agriculture onto land that has other uses. If this agricultural expansion is into high carbon stock land, it could (partly) negate the greenhouse gas (GHG) savings obtained by using biofuels instead of fossil-derived fuels. The risk of ILUC effects led to the introduction of Directive 2015/1513 (the 'ILUC Directive') which set a limit on the contribution of biofuels from food and feed crops towards the RED transport target and introduced the concept of 'low ILUC-risk biofuels'.

The recast of the Renewable Energy Directive (Directive 2018/2001, or 'REDII') entered into force on 24 December 2018. REDII promotes the development of renewable energy in the coming decade through an EU-wide binding renewable energy target of at least 32% by 2030. REDII also:

- Restricts the total contribution of **biofuels, bioliquids and biomass fuels made from food and feed crops**[29] in each Member State to one percentage point over their contribution in 2020, with a maximum of 7%;

- Limits the contribution of **high ILUC-risk fuels** to the 2019 level, and requires that their contribution be gradually phased out (reduced to 0%) by 2030;

- Defines **low ILUC-risk biofuels**, with the Commission publishing Delegated Regulation (EU) 2019/807 in March 2019 which set the criteria to define **both** low and high ILUC-risk biofuels.

Delegated Regulation 2019/807 details criteria to define **high ILUC-risk** feedstocks, which are those for which a significant expansion of the feedstock production area into land with high carbon stock is observed. **Low ILUC-risk biofuels offer an opportunity for economic operators to avoid the phase out of high ILUC-risk fuels**.

Note that, as currently defined, low ILUC-risk certification does **not** avoid the cap on food and feed based biofuels. However "intermediate crops" are exempt from that cap[30], subject to the condition that using them for biofuel production "does not trigger demand for additional land". Whilst the focus of this report is on low ILUC-risk certification in the context if the Delegated Regulation 2019/807, reflections are also provided on the definition of intermediate crop and how the methodology to determine additional biomass from the low ILUC-risk approach could be used to demonstrate that an intermediate crop does not "trigger demand for additional land".

Core to the concept of low ILUC-risk biofuel certification is to demonstrate that **'additional biomass'** is being produced. This is biomass produced above and beyond the amount of biomass that would have been produced if an additionality measure was not introduced, meaning that displacement of food and feed production is avoided.[31] In this way, food and feed based biofuels do not displace the existing use of crops for food and feed, but are produced from a new feedstock base which is additional to current production levels.

Delegated Regulation 2019/807 (Article 2(5)) allows for the certification of additional biomass that is either:

- Biomass produced on an existing farm or plantation as a result of a sustainably implemented **yield increase measure**, or

- Any action that enables the cultivation of biomass on **unused, abandoned or severely degraded land**.

For a farmer to become low ILUC-risk certified, it is necessary to prove that they are taking an **'additionality measure'** (to increase yield or enable cultivation on unused, abandoned or severely degraded land). They must be able to compare the new observed yield after the additionality measure to a **'dynamic yield baseline'** and prove the **'additionality'** of the

[29] REDII Article 2(40) defines food and feed crops as "starch-rich crops, sugar crops or oil crops produced on agricultural land as a main crop excluding residues, waste or ligno-cellulosic material and intermediate crops […]"

[30] The definition of food and feed crops in Article 2(40) of the REDII explicitly excludes "[…] intermediate crops, such as catch crops and cover crops, provided that the use of such intermediate crops does not trigger demand for additional land". In this project we tested "sequential cropping" as an approach to produce additional biomass on existing agricultural land. This part of the project provides insights into how intermediate crops could be implemented in the context of the food and feed cap.

[31] Delegated Regulation 2019/807 Article 2(6) defines 'additional feedstock' as "the additional amount of a food and feed crop produced in a clearly delineated area compared to the dynamic yield baseline and that is the direct result of applying an additionality measure"

measure by passing a financial attractiveness test or barrier analysis. Measures on abandoned or severely degraded land or measures taken by independent small holders less than 2 hectares are exempt from the additionality test. Full definitions of the terminology used from Delegated Regulation 2019/807 are provided for context in the relevant sections of chapter 3 of this report. Full instructions on how to demonstrate compliance are detailed in the Low ILUC-risk certification guidance, produced as part of this project.

Delegated Regulation 2019/807 was accompanied by a report from the Commission to the Parliament on the status of production expansion of relevant food and feed crops worldwide (COM(2019) 142), further referred to as the 'feedstock expansion report'. Alongside the Delegated Regulation 2019/807, section IV of the feedstock expansion report describes the principles of low ILUC-risk certification.

Article 7 of Delegated Regulation 2019/807 requires the Commission to review all relevant aspects of the feedstock expansion report and the exemption for small holders from the additionality test, as detailed in Article 5. This project serves to assist the Commission in this review by testing the quality, performance, and reliability of the criteria set in the Delegated Regulation to characterise low ILUC-risk biofuels prior to widespread use. In this project, we therefore work with farmers and plantation managers in different regions for different crop types, to gather and process the required data and evidence to establish the validity and robustness of the low ILUC-risk criteria, ensuring the approach follows the principle of additionality and can be applied irrespective of the type of crop, farm or location.

The outcome of this project is guidance on how the Delegated Regulation can be applied in practice. The project also delivers a critical review of the aspects described in the Delegated Regulation and section IV of the feedstock expansion report and recommendations to the Commission on how the Delegated Regulation could be adapted or interpreted.

The findings from phase 1 of this project[32] served as input to Annex VIII of the Implementing Regulation 2022/996 which further details how the low ILUC-risk criteria shall be implemented.[33] The final outcome of the project provides detailed certification guidance and templates that can be used as an add-on module by Commission-recognised voluntary schemes to certify low ILUC-risk biofuels, bioliquids or biomass fuels.

Further to this project, in December 2022, the Commission published for public consultation a proposed list of feedstocks to be added to Annex IX of the REDII.[34] Annex IX feedstocks can be double counted towards the renewable energy in transport target and can count towards the advanced biofuel sub-target in the REDII. The Commission's proposal includes both 'intermediate crops' and 'non-food crops grown on severely degraded land'. Whilst the focus of this report is on Delegated Regulation 2019/807, reflections are provided on how elements of the low ILUC-risk certification approach could serve as guidance to support implementation of the definitions proposed for Annex IX.

[32] Phase 1 report, 29 June 2021: https://iluc.guidehouse.com/images/reports/Low_ILUC_Phase_1_Report.pdf

[33] Implementing Regulation 2022/996 of 14 June 2022 on rules to verify sustainability and greenhouse gas emissions saving criteria and low indirect land-use change-risk criteria: https://eur-lex.europa.eu/eli/reg_impl/2022/996/oj

[34] Public consultation on proposed list of feedstocks to be added to Annex IX of the REDII: https://ec.europa.eu/info/law/better-regulation/have-your-say/initiatives/13484-Biofuels-updated-list-of-sustainable-biofuel-feedstocks_en

2. Project approach

This chapter describes the overall project approach and timeline and gives an overview of the ten pilot projects.

2.1 Project tasks and timeline

The project was conducted in two phases of 18 months each. Five pilots were conducted in each phase, therefore ten pilots in total. The phased structure enabled iteration and improvements, building on the findings of phase 1 to further refine the questions that were tested in the pilots in phase 2. Additionally, it provided the opportunity to re-design pilots and iterate the draft certification guidance, based on the findings from the phase 1 pilots, and stakeholder and expert feedback.

The project started in January 2020 and concludes in 2023. Findings from phase 1 informed Annex VIII of Implementing Regulation 2022/996 and the final project findings will inform the Commission's review of Delegated Regulation 2019/807 and section IV of the feedstock expansion report.

The project was structured in four main tasks, which were repeated in each phase:

- Task 1 is the **pilot design and identification**;
- Task 2 was to conduct the **pilot audits** to test the low-ILUC risk methodology;
- Task 3 is the **review of the low-ILUC risk methodology**, based on pilot findings and stakeholder feedback; and
- Task 4 was **stakeholder engagement**, which included ongoing activities throughout the project timeline.

Note on COVID-19: as the project kicked-off in January 2020, the impact of the global COVID-19 pandemic started to become apparent in the first few months of the project. The approach to several the tasks in phase 1 and their timeline had to be adjusted to reflect the restrictions imposed by the pandemic, most importantly the travel restrictions. For phase 1 and parts of phase 2, the contact and collaboration with pilot participants was online. In phase 1, scoping sessions and pilot audit meetings between the consortium and pilot companies were conducted online. Although in some cases, domestic travel was still permitted, so whenever possible, a local Control Union auditor attended the pilot audit onsite and other members of the consortium joined the audit meetings online. International travel was (mostly) possible again during phase 2, which allowed the consortium to visit the pilots and accompany the local auditors for the onsite pilot audits. Stakeholder sessions were conducted as online webinars, rather than in-person workshops. Whilst this has some disadvantages, it did give the opportunity for a larger number of stakeholders to join the sessions than would have been possible in person, and stakeholder were able to join from all regions represented by the pilot locations, including from both SE Asia and Latin America.

2.2 Pilot overview and selection criteria

This section gives an overview of the ten pilots conducted as part of the project, including the criteria to select the pilots. Note that the detailed findings from the pilots are published in ten individual pilot reports. **Figure 3** shows a map overview of the ten pilots and Table 2 shows the overview of crops, locations, pilot companies involved and a high level summary of the rationale for each pilot and key aspects tested.

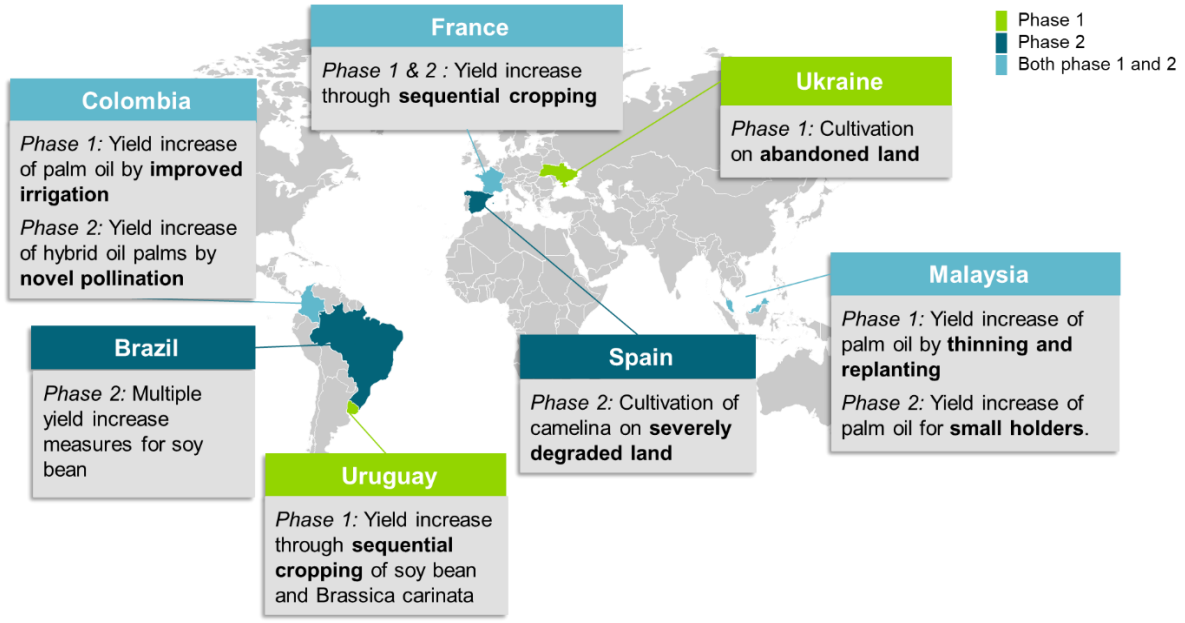

Figure 3. Map overview of pilot projects

At the start of each phase of the project, and together with the Commission, the project team researched and selected five pilot projects (ten in total over the two phases).

For phase 1, five pilots were selected that represented the best combination of individual suitability and collective completeness, using the criteria in Table 1. The projects individually and jointly allow for testing low ILUC-risk biofuel feedstock cultivation on farms and plantations covering different crop types (oil and starch) in different geographical regions (EU, South-East Asia and Latin America) and covering both types of additionality measure for low ILUC-risk biofuels certification, as included in the Delegated Regulation 2019/807: (a) producing additional biomass through above-baseline crop yield increases and (b) crop cultivation on unused, abandoned or severely degraded land.

Table 1. Individual suitability & Collective completeness

Individual suitability	Collective completeness

• Preliminary scope and design
  • Crop type, location, scale, additionality measure, pilot planning
• Relevance and credibility
  • Relation to REDII/Delegated Regulation additionality criteria
  • Expected outcomes
  • Company/holding commitment
  • Data transparency commitment
	• All scope regions
	• All scope crops
	• All additionality measures
	• All low ILUC-risk criteria/items

The findings from the phase 1 pilots led us to focus the phase 2 pilots on specific aspects of the low ILUC-risk certification methodology that required further research or elaboration. The set of pilots for phase 2 covered the same diversity in crop types, geographic regions and additionality measures. Additionally the phase 2 pilots allowed to represent different certification scopes (small holders, group certification and individual farmers). Table 2 provides a detailed overview of the pilots of phase 1 and 2.

Table 2. Overview of the pilot projects

Phase	Location	Crop type	Additionality measure	Pilot organisation	Rationale	Key aspect tested
1	Malaysia, SE Asia	Oil palm	Yield increase: thinning and replanting of clonal seedlings	Confidential large plantation	Major palm producing country	Low ILUC certification for perennial crops
	Colombia, Latin America	Oil palm	Yield increase: improved irrigation	Palmeras de la Costa (plantation) and Fedepalma (industry association)	Major palm producing country	Low ILUC certification for perennial crops
	Uruguay, Latin America	Soy and Brassica carinata	Yield increase: sequential cropping of soy bean and Brassica carinata	UPM	Proven yield increase measure and interest in low ILUC certification. Good data availability.	Low ILUC certification for sequential cropping
	France, EU	Arable crops in rotation	Yield increase: sequential cropping on arable farm with biogas	Arvalis (research institute) and farmers from RECITAL project	Arable crops for biogas. Concept implemented in Italy – aim to test in more northern climate	Low ILUC certification for sequential cropping
	Ukraine, Europe	N/A*	Cultivation on abandoned land	Agrobiznes	Abandoned land in non-EU Europe	Determining land status for abandoned land**
2	Malaysia, SE Asia	Oil palm	Yield increase: small holders	Wild Asia Group	Major palm producing country – small holder group	Group certification and small holders
	Colombia, Latin America	Oil palm	Yield increase: innovative pollination	Palmasol/EntrePalmas	Major palm producing country – potential first of a kind measure	Barrier analysis test (first of a kind measure)
	Brazil, Latin America	Soy	Yield increase: various	Confidential	Major soy producing country	Low ILUC certification for annual crop
	France, EU	Arable crops in rotation	Yield increase: sequential cropping on arable farm with biogas	Arvalis (research institute) and farmers from RECITAL project	Complex crop rotation systems, ability to test different additional biomass scenarios	Calculating additional biomass for sequential cropping
	Spain, EU	Camelina (annual oilseed)	Cultivation on severely degraded land	Camelina Company	Severely degraded land in EU	Determining land status and thresholds for severely degraded land**

**The land is abandoned and there was no crop grown at the time of the pilot*
***Additionally test not needed for abandoned or severely degraded land*

2.2.1 Individual suitability

The individual suitability of the ten pilots that were finally selected is described below.

Malaysia, both phases, oil palm yield increase and group certification for small holders

- Palm is currently the only crop that meets the high ILUC-risk criteria, as defined by the Delegated Regulation 2019/807, so it is a priority to test in the pilots. South-east Asia is the largest oil palm producing region, so it was a priority to conduct a pilot in this region, although there is some political sensitivity so it was not easy to find companies willing to participate.

- For the first round of pilots, good data availability was a key priority to enable all calculations required for low ILUC-risk certification to be tested. A lead pilot company was identified who own and operate a large plantation and mill in the Sabah region of East Malaysia. The company has very good data availability, including sub-plot level yield data, and the plantations are implementing better agricultural practices to improve yield on an ongoing basis. Specific yield increase measures included thinning when the trees were age 7-8 years old on some sub-plots to allow better growth of the remaining trees and a replanting programme with clonal varieties of pol palm trees. The pilot company also has an international presence, so was able to bring broad insights into the applicability of the methodology beyond the specific plantation.

- For phase 2, the aim was to test the approach to certify small holders and further develop the group certification approach. Small holders are expected to have a larger potential to increase yields and group certification at the feedstock producer level is common in many supply chains, so it is important to detail how this should work in the context of low ILUC-risk certification. The phase 1 pilot company helped to identify a group of small holders, Wild Asia Group, who were willing to participate and test the small holder provision and the approach to group certification. The Wild Asia Group are already certified as a group and are located in the Sabah region of East Malaysia, supplying palm to a variety of customers including the phase 1 company's mills. The average size of small holders in the group is 3ha, so in practice part of the group would be exempt from the additionality test and part not. Wild Asia Group, acting as a central office for group certification, support the small holders with data management and advice on a range of different yield increase measures.

Colombia, both phases, oil palm yield increase

- The Colombia pilots offer an opportunity to test the approach for oil palm yield increase in a second geographical region, which was a priority as palm is currently the only crop that meets the high ILUC-risk criteria.

- In phase 1, the association of Colombian palm oil producers, Fedepalma, supported the pilot process. Fedepalma supported the project team to identify a short list of plantations who could take part in the pilot, according to mutually agreed criteria. Three plantations were shortlisted by Fedepalma. Fedepalma took into account the strength of the plantation's technical team, an existing RED voluntary scheme certification, the implementation of best agricultural practices for at least three years and the use of a good information management system. The chosen plantation was

Palmeras de la Costa, an integrated plantation and mill in the Northern Oil Palm Zone of Colombia who had recently implemented a new irrigation system.

- In phase 2, one of the key aspects to further develop was the barrier analysis. Through conversations with Fedepalma, we identified a novel approach to pollination of hybrid palms which is leading to higher yields. Based on this information, the local Control Union office helped to identify a plantation and mill who had implemented this a novel approach. This was considered as a potential first of a kind measure.

Uruguay, phase 1, soy bean and Brassica carinata sequential cropping

- UPM Biofuels S.A., the Uruguayan subsidiary of UPM-Kymmene Corporation, supported this pilot. UPM is a forest industry company headquartered in Helsinki, Finland. UPM Biofuels produces renewable and sustainable products for the transport and petrochemical industries. UPM has been implementing sequential cropping for several years in Uruguay, under annual contracts with local farmers. The measure aims to produce additional feedstock (Brassica carinata) for EU biofuels. UPM has a knowledgeable project team and good access to data.

Brazil, phase 2, soy bean yield increase

- As no pilot had been conducted for soy in phase 1, the aim of this pilot was to test the whole low ILUC-risk certification approach. The initial contact for this pilot was with a large international commodity company and biofuel producer, who helped to select the farms and facilitated contact with the farmers. We selected two farms to participate in the pilot as both were willing to participate. Also, two farms provide a better overview of the agricultural practices and possible additionality measures in the region. The two farms are medium to large sized, privately owned soy farms located in the Bahia State region of Brazil. Both farms applied several yield increase measures that could potentially count as additionality measures. As this is likely to be the case for most farms, the application of several additionality measures was an interesting aspect to test.

France, both phases, sequential cropping on arable farms for biogas

- This pilot provides an opportunity to test the low ILUC-risk approach in the EU. It is also the only pilot looking specifically at biogas production, rather than biofuel. The concept of sequential cropping for biogas is well tested in Italy connected to the Biogas Done Right initiative, so the aim was taken to test the extent to which a similar approach can be replicated in France, which is further north and as such has a shorter growing season.

- The project team identified an opportunity to work with an existing research project called “RECITAL”, which focuses on sequential cropping from an agricultural perspective. This offers the opportunity to work alongside that project to test the low ILUC-risk certification perspective. The RECITAL project runs for the period 2020-2023 and is led by Arvalis Institut du Végétal, a French applied agricultural research organization, in partnership with the Association of Biogas Farmers of France (AAMF) as well as the network of Chambers of Agriculture and other economic operators of France.

- Arvalis supported the project to select farms for the pilot. Initially, three different farms were selected for the phase 1 French pilot, as travel restrictions were uncertain during the COVID-19 pandemic. For the purpose of the audit, it was decided to focus

on one farm only where an on-site visit could be organised. The farm chosen is in Centre-Val de Loire region and produces cereals and oilseeds in rotation. It started to implement sequential cropping before the pilot project started. The farm had the advantage of collecting detailed yield and financial data because they function as a group of farmers who jointly manage the land. This means that more detailed yield and financial data are available than might normally be the case on a typical farm in this region, as farmers in the group need to closely monitor costs and yields for profit re-distribution purposes at the end of the campaign.

- For phase 2, Annex VIII of the Implementing Regulation 2022/996 set out different methodological options to calculate additional biomass for sequential cropping. Arvalis supported the project to select two farms which enabled testing of two of the calculation options set out in the Implementing Regulation – option 1 and option 2b. (Option 2a was covered by the Uruguay pilot in phase 1.)

Ukraine, phase 1, cultivation on abandoned land

- This pilot provides the opportunity to test the identification of abandoned land in Europe (non-EU).

- A literature search on abandoned land in Ukraine identified which regions could have the largest potential for abandoned land. Through this exercise, we identified researchers from the Ukrainian National Forestry University who have done extensive research on abandoned agricultural land in Ukraine. This team analyses satellite images and performs mapping of such land. Through contacts of these researchers, an area of land was identified that we believed could meet the definition of abandoned land in the legislation. Whilst the land is not currently growing feedstock for biofuel, it does allow to test the definitions of abandoned land in the legislation and to demonstrate that the land is suitable for agriculture.

- The plot of land tested is owned by a company called Agrobiznes. The plot formerly grew rye in the Soviet era nearly 25 years ago on what is known as “kolkhozes”, or community state companies, and was then abandoned. The project team worked in collaboration with researchers from the Ukrainian National Forestry University, a representative from the local administration, and a representative from Agrobiznes, to test the methodology for determining abandoned land.

Spain, phase 2, cultivation on severely degraded land

- This pilot provides an opportunity to test cultivation on severely degraded land in Europe (EU).

- A literature search on severely degraded land identified the various types and stages of degradation. We conducted interviews with organisations involved in restoring and cultivating on severely degraded land, which supplemented more practical examples and insights. A short-list of potential phase 2 pilot options was identified and discussed with the project team and the Commission. Appendix F provides an overview of different examples of severely degraded land considered, including the short-listed options.

- The pilot selected was in Spain and supported by the Camelina Company. The Camelina Company identified a plot of land in Spain located in an area that is prone to wind erosion and as a result has a shallow topsoil (15-20 cm on average). The farmers in this area commonly have a full fallow year between cultivating crops due

to the shallow topsoil. The farmer involved in this pilot implemented measures to slow down erosion and enhance the quality of the soil 20 years ago: not working the land until the first rain to prevent dry topsoil removal by the wind and moving to a low tillage / no tillage system. Because of this change the farmer was able to omit the fallow year and introduce camelina into the rotation. Camelina enables the farmer to keep the soil covered by direct seeding and thus minimize soil removal by erosion and reduce weed cover.

2.2.2 Collective completeness

Taken together, the ten pilot projects allow to different crop types (four perennial oil palm plantations, one farm growing soy bean, three examples of sequential cropping), across three geographical regions (two in South East Asia, four in Latin America, three in the EU and one in non-EU Europe), both main types of ILUC additionality measure (yield increase and cultivation on abandoned land and severely degraded land) and different scopes (small holders, group certification, individual farms and plantations integrated with mills).

The project did not include a pilot on any sugar crops, such as sugar cane. We reached out to several different organisations in the sugar cane sector, both during the proposal phase and during the project, and noted that interest was low. Sugar cane ethanol already has relatively low GHG emissions associated with its ILUC score in the REDII and the EU biofuel market has relatively low importance for Latin American ethanol producers, so parties do not see the immediate business priority to engage. In the EU sugar beet setting, we see relatively little room for low ILUC certification because the sugar beet yields are already high and there is little unused or abandoned land in the regions where sugar beet is produced.

We furthered our efforts to find a suitable sugar cane party from March 2020 onwards and identified several mills that might be interested via the BonSucro voluntary scheme. However, a COVID-19 wave hit Latin America during late Spring and early Summer 2020 and the identified mills were no longer able to commit resources at that time. Given this situation and the importance of oil palm as the only high ILUC feedstock, a decision was taken, in discussion with the Commission, to focus efforts on developing a second palm pilot instead of a sugar pilot. Note that sugar cane was the subject of a case study in the project to develop the low ILUC certification guidance in the context of Framework Service Contract ENER/C1/2018-513.

2.3 Pilot audit approach

Ten pilots audits were conducted in total, five in phase 1 and five in phase 2. The overall aim of the pilot audits is to test the certification approach for low ILUC-risk certification. There are several parts to that aim:

- To test the overall certification approach and process – are the steps logical and is the documentation clear?
- To test data availability – is robust and verifiable data available to conduct the necessary calculations?
- To identify any issues with the low ILUC methodology so that they can be further developed.

For all the yield increase pilots, the additionality measure had already been taken, so we were able to do a combined “baseline audit” (to calculate and check the dynamic yield baseline and additionality test) and an “additionality audit” (to check the volume of additional

biomass produced). The approach for the phase 1 audits was to test the whole low ILUC-risk methodology for each pilot to test the overall approach and identify and address methodological issues. The phase 2 pilots focused more in-depth on specific outstanding issues per pilot that had been identified in the first phase.

The pilot audits were conducted by local ISCC-trained auditors from the certification body Control Union. Prior to the audits (both in phase 1 and 2) the local auditors attended a half-day training by ISCC on the low ILUC-risk methodology and certification guidance. The phase 1 pilot audits were conducted in the first quarter of 2021 and phase 2 pilot audits in the third and fourth quarters of 2022. Due to COVID-19, the consortium had to join the phase 1 audits remotely while the local auditors attended in person. However, for phase 2 it was mostly possible for members of the consortium to join the pilot audits in person.

Before the audits were scheduled, the consortium shared with all pilot companies the draft certification documents developed by the project team, namely: the **Low ILUC-risk Certification Handbook** (guidance), **Audit checklist template** (to be filled in by the auditor) and **Management plan template** (to be filled in by the pilot participant). The project team talked the pilot companies through the documents and the companies had an opportunity to reflect, ask questions and give feedback.

Each pilot audit was conducted over the course of one to two days. As is standard with "normal" certification audits, once the audits were scheduled and prior to the audit date for each pilot, Control Union shared an "Audit Plan" with the pilot company, which includes an agenda for the audit and the list of data and document templates needed from the pilot company. The main template for the pilot company to fill in is the management plan template. For the palm yield increase pilots, the consortium also shared a dynamic yield baseline Excel calculation tool, and for all relevant pilots the consortium shared an NPV Excel tool to conduct the financial attractiveness assessment. This enabled the pilot company to be ready with the appropriate data and filled in management plan at the start of the audit.

In general, for phase 1, the first day of the audit consisted of a kick-off meeting where the agenda of the audit was presented, followed by data collection. The auditor then independently assessed the data and filled the audit checklist accordingly. The second day consisted of questions from the auditor to the pilot company, a final filling of the audit checklist and the audit was concluded with a meeting between the auditor and pilot company to discuss the findings, walk through the audit checklist, clarify any remaining questions from either side. As these were pilot audits, there was also a strong focus on discussing feedback on the overall process, approach and methodology in the concluding meeting. Where time zones allowed, the consortium joined either the concluding audit meeting, or if not, a feedback meeting was scheduled between the audit, the pilot company and the consortium in the days following the pilot. For phase 2, the audits lasted 1-4 days, depending on the pilot. (The Malaysia phase 2 audit visit lasted 4 days and this time also included a day to visit different small holders from within the group and a day to visit the phase 1 mill. Whilst some of this time was spent discussing the approach more broadly that would be done in practice if this were a "real" audit, the auditor may need to visit the mill to verify yield data and they may also need to visit more small holders than was done during the pilot to reach the square root of the number of participants in the group.) During the audit visits, the local auditor would focus on independently assessing the data and filling in the auditor checklist, while the consortium members were present to ask clarifying questions to understand how the methodology works in practice.

The local Control Union auditor filled in the audit checklist and a **Summary Audit Report** was prepared by the Control Union team in Berlin, which summarised for the consortium the process, results, and feedback for each pilot.

The list of documents prepared during each audit and the responsible party is summarised in the table below. In addition to these documents, the pilot lead in the consortium (Guidehouse) also prepared a pilot report with the findings from each pilot.

Table 3. List of documents from pilot audit and responsible parties

Responsible party	Document
Pilot company	Management plan
	Dynamic yield baseline and additional biomass calculation*
	Financial attractiveness assessment*
	Other supporting data as relevant. E.g., copies of voluntary scheme certificates (e.g., ISCC, RSPO), maps and kml files, planting schedules, satellite imaging report
Control Union	Audit checklist
	Summary audit report

** The dynamic yield baseline, additional biomass calculation and financial attractiveness assessments were not prepared for the Ukraine and Spain pilots as for cultivation on abandoned and severely degraded land, the baseline is zero and they are is exempt from the additionality test.*

2.4 Approach to review the Low ILUC-risk methodology

The feedstock expansion report describes the concept underlying low ILUC-risk certification, with the following headings:

- Preventing land displacement through additionality measures
- Ensuring additionality beyond business as usual
- Guaranteeing robust compliance verification and auditing

The Commission asks that a review of the low ILUC-risk methodology establish whether the low ILUC-risk criteria can be implemented in practice so they are achieving the following objectives:

- Additionality: In line with the main objective, low ILUC certification should trigger **real additional improvements** in productivity and production that go beyond the expected increase. As a consequence, it should apply only to the additional amount of feedstock resulting from the application of increased productivity-promoting schemes or cultivation of crops on areas which were previously not used for cultivation of crops. The criteria should include elements **addressing the risk of windfall gains**.
- The criteria shall be applicable to **all relevant types of food and feed crops** that are commonly used for production of biofuels and bioliquids
- The criteria shall be applicable both **in the EU and in third countries**

- The criteria should be implementable both for **single holdings or groups of holdings**
- Implementation of the approach shall ensure additionality in a **feasible and verifiable** manner while **limiting costs for the producer**
- The approach shall meet **adequate standards of reliability, transparency, and independent auditing**. It should **take account of annual yield fluctuations** and variation of yields.

As described, the low ILUC-risk pilots were designed and chosen to cover a range of different types of crops, different countries and different types and scales of holdings, to give insights into these questions. The Low ILUC-risk certification guidance was designed as an add-on to existing EC-recognised voluntary schemes and to use data that a farmer is expected to have access to, to minimise their administrative burden. Using the module alongside existing recognised schemes is also designed to ensure adequate standards of reliability, transparency, and independent auditing.

The findings from the pilots are analysed in chapter 3 of this report. For each of the low ILUC-risk criteria, the report considers whether the pilots were able to provide accurate and reliable data and whether the criteria were accurately measured / identified.

Section 3.1 gives a high-level overview of the findings from the ten pilots following the overall headings in the feedstock expansion report and the specific criteria required for low ILUC-risk certification. The sections thereafter describe a synthesis of the findings from the pilots, according to the same headings. Detailed results for each pilot can be found in the individual pilot reports. At the end of chapter 3 is an overview of the key challenges related to low ILUC-risk certification that auditors should be mindful of when certifying low ILUC-risk projects, based on the pilots. Chapter 4 describes the extent to which the low ILUC-risk approach is applicable to different feedstocks, regions and types of production.

2.5 Stakeholder engagement

Stakeholder engagement was an important strand of the work throughout the project. The ten pilot projects enabled the project team to directly work with a range of different organisations, including farmers, first gathering points, commodity trading companies, biofuel companies and research institutes and trade organisations. In addition to the pilots, stakeholders were engaged through various channels, described below.

Project website: A project website (https://iluc.guidehouse.com/) was developed and launched at the start of phase 1. The website is shared with Lot 1 of the same contract number for DG Energy, which aims to review the data to define High ILUC-risk feedstocks. News updates and deliverables were published on the website during the course of the project, including the slides for the stakeholder webinars, the call for data (see below) and the five pilot reports[35] and phase 1 report[36] which were published on the website in April 2022. The website also includes a dedicated email address to email the project team.

Webinars: In phase 1, there were two stakeholder webinars. The first one was held in November 2020 and was attended by 150+ participants from whom comments and feedback were collected. This webinar presented the draft low ILUC-risk certification approach to be

[35] https://iluc.guidehouse.com/news/lot-2/23-low-iluc-pilots-individual-phase-1-pilot-reports-published
[36] https://iluc.guidehouse.com/news/lot-2/22-low-iluc-pilots-phase-1-findings

used in the pilots.[37] The second webinar was held at the end of phase 1 in May 2021 and presented the findings from the first round of pilots, namely Colombia, Uruguay, France, Malaysia, and Ukraine. The webinar reflected on the Low ILUC-risk methodology, based on these pilot findings and provided an opportunity for direct feedback and questions.[38] For both webinars, the slides were published on the project website and a list of frequently asked questions was prepared and updated for the website. Additionally, the stakeholders were presented with the project email address at every webinar in case questions arose after concluding the webinar or they wanted to provide feedback. A final webinar is planned for the end of phase 2 to disseminate findings.

Expert interviews yield increase barriers: In Q3-Q4 of 2021, the project team held five in-depth interviews to further develop the non-financial barrier test and make it more objective. The interviews were with development banks and NGOs who work on a daily basis with farmers to improve their farming practices. The main topic of discussion were the barriers that small/medium sized farmers face to increase their yield, and the type of support these organisations provide to overcome these barriers. A total of eight barriers were identified and used as input for the phase 2 pilots. The organisations shared their concerns on how farmers can prove the link to the EU biofuels market as it will be hard to prove that a barrier is overcome only because of the EU bioenergy targets. The insights from the interviews were shared and discussed with the Commission and fed into the barriers analysis test described in the certification guidance.

Call for data on palm yield curves: In July 2021, the project team published a call for data[39] to collect data on representative oil palm yield curves in order to develop and validate the "standard oil palm yield curve" that can be used to determine a yield baseline for oil palm in the low ILUC-risk certification methodology. The call received a good response from stakeholders, covering a range of different geographies in key oil palm producing countries. From the submissions, 31 yield curves were derived and analysed, covering both large-scale and small holder plantations. The data provided by the stakeholders, data from the phase 1 palm pilots and additional literature research fed into the 'standard yield curve for oil palm' report, published on April 6th, 2022.[40] The standard yield curve is included in Annex VIII of the Implementing Regulation 2022/996 on 'rules to verify sustainability and greenhouse gas emissions saving criteria and low indirect land-use change-risk criteria'.

Pilot selection severely degraded land: from December 2021 to March 2022 interviews were held with a range of stakeholders to explore the options for a suitable severely degraded land pilot. This was accompanied by literature research of different practical examples of severely degraded land, the different examples and short-list is included in Appendix F. In addition to that, the project team had several calls with the JRC in June and August 2022 to discuss the level of appropriate thresholds and a methodology to determine severely degraded land. These calls were also accompanied by literature research and fed into the phase 2 severely degraded land pilot, the soil sampling protocol and the certification guidance.

Public consultation: from 24 May 2022 to 24 June 2022 a public consultation was held as part of the project. The consultation aimed to give stakeholders an opportunity to review the draft guidance on low ILUC-risk certification at the end of phase 1 and to provide suggestions for improvement. Feedback was especially sought on the following topics: barrier analysis, group certification approach, approach to determine additional biomass for

[37] https://iluc.guidehouse.com/publications/18-low-iluc-introductory-stakeholder-webinar
[38] https://iluc.guidehouse.com/news/lot-2/15-first-low-iluc-risk-pilot-results-presented-at-webinar
[39] https://iluc.guidehouse.com/news/lot-2/17-call-for-data-standard-yield-curve-for-oil-palm
[40] https://iluc.guidehouse.com/news/lot-2/20-response-to-call-for-data-standard-yield-curve-for-oil-palm

sequential cropping, certification of soy and annual crops, and abandoned and severely degraded lands. A total of 12 questionnaire submissions were received during the consultation runtime and further 4 stakeholders submitted general comments or questions on the guidance. Most stakeholders were biofuel and feedstock producers, with some responses from institutes and academia.

The key stakeholder inputs, questions and concerns received are reflected through this report and a separate stakeholder consultation summary report, which is published as a separate report.

3. Review of low ILUC-risk certification

This chapter aims to support the Commission's review of section IV of the feedstock expansion report, as set out in Article 7 of the Delegated Regulation. This chapter compiles the findings from the ten pilots, together with relevant stakeholder feedback, to analyse the different elements required for low ILUC-risk certification. Findings from the phase 1 pilots are included to provide the complete overview, although it should be noted that these findings have already fed into the requirements described in Annex VIII of Implementing Regulation 2022/996 on rules to verify sustainability and GHG emissions saving criteria and low ILUC-risk criteria.

The final section in this chapter provides an overview of key challenges associated with low ILUC-risk certification, as identified through the pilots, that auditors should be aware of when certifying low ILUC-risk projects.

3.1 Overview of pilot findings

The following table gives a high-level overview of the findings from the ten pilots following the overall headings in the feedstock expansion report and the specific elements required for low ILUC-risk certification. The following sections describe these findings in more detail, reflecting on lessons from the different pilots.

Theme	Question	Sub-question	Summary of pilot findings
Additionality test	Could financial additionality be reliably demonstrated?	Availability and reliability of data	Cost data was available for all pilots to a reliable level but pilots indicated that predicting future costs would be tricky if the measure had not yet been taken.
		Accuracy of the resulting financial analysis	Although an accurate basic financial analysis was carried out for most pilots, the analyses did not always include all relevant cost factors. None of the pilots passed the financial additionality test.
	Were (non-financial) barriers identified?	Availability and reliability of data	Barriers were described qualitatively by most pilots with different levels of evidence to support the barrier.
		Accuracy of the resulting non-financial analysis	Auditors were unsure how to judge the validity of the barrier described. Auditors found it hard to determine what type of evidence was needed to pass the barrier analysis. Especially because all measures were taken in the past. Uruguay, Colombia and Malaysia phase 2 pilots deemed to present valid barriers, but also noted the ambiguity in the requirements.
Yield baseline and increase	Could a dynamic yield baseline be	Availability and reliability of data	Good quality yield data available for all the pilots, and for some pilots yield data was available per sub-plot. Some plot-by-plot variation.

Theme	Question	Sub-question	Summary of pilot findings
	reliably calculated?	Accuracy of the resulting yield baseline	Accurate baselines calculated for some of the perennial crop pilots, but scale of weather impact and data variations caused concerns for the robustness of the baselines calculated for some pilots. For the sequential cropping pilots, a range of different approaches were tested which yielded different results.
	Could a yield increase following the additionality measure be reliably calculated?	Availability and reliability of data	Good quality yield data available for all the pilots, and for some pilots yield data was available per sub-plot.
		Accuracy of the resulting yield increase	Two of the perennial crop pilots found that additional biomass was more dependent on weather than the additionality measure. The sequential cropping pilots found big differences in the volume of additional biomass that could be claimed, depending on the approach used.
	Does the approach adequately take into account annual yield fluctuations and variation of yields?		Weather and other effects had a large impact on both the baseline and the additional biomass data. Outliers can be removed from the data for the baseline calculation, but the additional biomass calculation is still impacted.

3.2 Additionality test

This section provides an overview of the findings from the pilots related to the two approaches to demonstrate additionality: the **financial attractiveness test** and the **barrier analysis**.

Definition

Delegated Regulation 2019/807 Article 5(1)(a)

1. Biofuels, bioliquids and biomass fuels may only be certified as low indirect land-use change-risk fuels if:

a) the additionality measures to produce the additional feedstock meet at least one of the following conditions:

(i) they **become financially attractive** or **face no barrier** preventing their implementation only because the biofuels, bioliquids and biomass fuels produced from the additional feedstock can be counted towards the targets for renewable energy under Directive 2009/28/EC or Directive (EU) 2018/2001;

(ii) they allow for cultivation of food and feed crops on abandoned land or severely degraded land;

(iii) they are applied by small holders;

The financial attractiveness test was conducted for all the phase 1 yield increase pilots and the Brazilian soy yield increase pilot in phase 2. The barrier analysis test was mostly the focus of the phase 2 pilots, although in some cases pilot participants also attempted this test in phase 1. Neither additionality test was studies in the abandoned or severely degraded land pilots as these are exempt. Whilst independent small holders smaller than 2 ha are also exempt from the additionality test, the Malaysia phase 2 pilot did explore barriers to yield increase to add knowledge to the project and because not all members of the certified group were smaller than 2 ha. Further reflections on the definition of small holders who are exempt from the additionality test can be found in section 3.9 at the end of this chapter.

3.2.1 Financial attractiveness test

Could financial additionality be reliably demonstrated?		
Pilot	**Availability and reliability of data**	**Accuracy of the resulting financial analysis**
Overall	Cost data was available for all pilots to a reliable level but pilots indicated that predicting future costs would be tricky if the measure had not yet been taken.	Although an accurate basic financial analysis was carried out for most pilots, the analyses did not always include all relevant cost factors.
Malaysia – 1	Granular cost data available at subplot level.	Large difference in costs in $/ha between subplots, even for the same additionality measure. Indicates this would have been difficult to predict if the measures had not already been taken.
Colombia – 1	Reliable cost data available.	The net present value (NPV) of the additionality measure was relatively easy to calculate as CAPEX and OPEX data were readily available and could be verified.
Colombia – 2	Data on cost of application of the additionality measure was available but it was known to be lower than the cost of the alternative (artificial pollination) so the financial attractiveness test was not conducted. The main cost to the plantation was in the research and development, for which cost data was not available.	The financial attractiveness test was not conducted as data on R&D costs were not available.
Uruguay	Reliable cost data available.	Calculated from the farmer perspective. This analysis did not include broader previously incurred costs, such as R&D, to develop Brassica carinata as a commercial crop.

Could financial additionality be reliably demonstrated?		
Pilot	**Availability and reliability of data**	**Accuracy of the resulting financial analysis**
France – 1	Financial data available at very granular (parcel) level.	Analysis reflected cost and benefit to the farmer but did not include cost of agronomic expertise on sequential cropping that needed to be developed.
Brazil	Data was available but not transparent for anyone else but the auditor.	From the documentation provided it was not clear which costs and benefits were accounted for the in the analysis. After follow up discussions it was concluded that not all benefits were accounted for.

Financial additionality was mainly tested in the phase 1 pilots, while the phase 2 pilots focused on the barrier analysis. Therefore, the analysis below focusses mainly on phase 1 pilots, plus the Brazil pilot from phase 2.

The pilot participants were able to conduct the financial additionality test as set out in the certification guidance thanks to sufficient availability and reliability of data from the pilot farms and plantations. However, the process was deemed difficult and some issues with the implementation of the methodology were raised, due to the **variability of biomass volumes (yields) both before and after the additionality measure, the variability in market prices for feedstocks needed to determine revenues in the calculation, and variability in the costs of the additionality measures taken** over the period considered. It should be noted that the pilot participants had already taken the additionality measures, so they had accurate records of financial costs and revenues, but the data showed significant variation year by year. Furthermore, several noted that **predicting and evidencing future costs and revenues would be tricky if the measure had not yet been taken, which is fundamental if applying for low ILUC-risk certification before a yield increase measure is taken.**

The Certification Body involved in the pilots suggested that the reality of biofuel supply chains' economics is much more complex than the financial attractiveness test allows for, as there are many factors determining the price of a commodity. Therefore, considering only additional yield for only the EU fuel market will be very theoretical. Another issue raised was the scope of costs that should be included in the analysis. For example, should research and development costs be allowed to be included, if they can be reliably quantified, for new technologies like seed development? The pilot companies for whom this was relevant did not have readily quantified research and development costs available. This type of innovative measure might be more robustly covered through the first-of-a-kind option within the barrier analysis (see section 3.2.2).

The calculations for additionality measures in phase 1 pilot projects, using costs and revenues from the farmer perspective only, all resulted in positive net present value (NPV). This means that none of the pilots would pass the financial attractiveness test. This can be logical as the investments that led to the production of additional biomass had been made before the engagement of pilot project owners in the low ILUC-risk pilot project. Furthermore as there was no premium available in the market for low ILUC-risk certified biomass when the pilots were conducted, any project would not be expected to be able to show (yet) that an investment case would have been negative, but with a low ILUC premium the investment case would be positive.

Availability and reliability of data

Overall, all phase 1 pilot projects had detailed and auditable financial data available for the evaluation. The financial attractiveness NPV calculations were consistently conducted in all pilots. In general, data for labour costs, material costs and other costs were available and verifiable, although noting, as mentioned, that the farmers kept good records of financial costs and revenues but predicting and proving future costs and revenues would be tricky for some types of measures if they have not yet been taken. For example, for the Colombia phase 1 pilot the farmer invested in a new irrigation system. While the economic operator would have had a quote to install the new system, the increase in yield that would be achieved was subject to uncertainty. Furthermore, they kept records of actual costs incurred, but not necessarily records of quotes received before the measure was taken. For the Malaysia phase 1 pilot, they conducted thinning on different sub-plots of the plantation when the trees reach a certain age, to improve the growth of the remaining trees. The records of cost per hectare to conduct thinning for different sub-plots varied very widely.

It is important to note that several pilot participants said that high data availability and reliability – as seen in the pilot participants – might not be typical of all farms. For example, the Uruguayan project pointed out that many farms in Uruguay are rented rather than owned by farmers; therefore, there might be gaps in data availability and continuity. For example if a farmer has not used the same plot of land for the last three years, it may be hard for them to access historical yield data specific to that plot. Similarly, the French phase 1 pilot had very granular level data available due to the farm group shared management arrangement, which was deemed rather uncommon in the region. To a certain extent, the phase 1 pilots were also pre-selected because of their good data availability to enable the calculations to be tested. Therefore, the availability and reliability of data in the pilot projects are considered of higher standard than will be the case for all farms.

The Brazil phase 2 pilot showed a negative NPV after the audit, but after further discussion with the pilot participants it appeared that not all benefits had been included in the calculation. This was considered to be an issue with understanding the methodology scope, rather than a lack of data availability.

Challenges related to data availability and reliability that were identified include (see section 0 for an overview of all main challenges):

- **It can be difficult to estimate the cost of measures not yet taken**. For some measures that are not yet implemented, an economic operator will have an estimate of the cost, for example based on a quote for new capital equipment. However, for other measures the cost might be more difficult to predict. In the Malaysia phase 1 pilot, the *actual* cost of thinning of oil palm trees varied greater than 10-fold for the different sub-plots of the plantation on a per ha basis, so for them estimating a per ha cost would be potentially difficult.

- **Future additional biomass volume predictions are highly uncertain**. Making a reliable estimate of future additional biomass volumes, as impacted by non-linear growth curves, non-ILUC-related practices and weather events is extremely challenging. Predicting future additional biomass has two roles: 1) to enable the auditor to check if the actual volume of additional biomass claimed is reasonable and in line with expectations to help them to flag and check volumes that could be too large and could indicate fraudulent activity, and 2) to feed into the revenue estimate in the financial attractiveness test. For the first, the certification guidance requires auditors to check additional biomass claimed against expected volumes and request justification from the economic operator if the figures are not in line. However, for the

second, it is harder to require the auditor to check the figure used in the financial attractiveness test ex-post and it should be avoided that this leads to a situation where the validity of the financial attractiveness test has to be checked each year to avoid excessive uncertainty and administrative burden for operators. **In principle, the additionality test should be a one-time test conducted up-front to become certified and should be valid for 10 years. This requires that significant scrutiny is given by auditors and voluntary schemes to the appropriateness of the estimates used in the financial attractiveness test up-front. Furthermore, if a certification audit is conducted before an additionality measure is taken, in the following audit, auditors should be required to compare costs incurred to costs predicted (and used as the basis for the financial attractiveness test) to ensure firstly that the additionality measures that involved a cost were actually taken and that the predicted costs were a reasonable estimate**. If the actual additionality measure in practice deviates significantly from the project plan and the auditor considers that the measure would not pass the additionality test in practice, then the auditor can withdraw the low ILUC-risk certificate.

- **Biofuel feedstock price variability impacts the financial calculations significantly.** Feedstock prices vary on a daily basis and across years as they are influenced by many different factors outside the control of feedstock producers. The low ILUC-risk certification guidance suggests using an average price over the period of historic yield data. It could be improved by providing additional details, e.g., clarify whether using a weighted average or median is allowed/required.

Accuracy of the resulting financial analysis

The NPV could be calculated using accurate data in all pilots, thanks to the availability and reliability of detailed CAPEX/OPEX data (see above, note that the ability to make an accurate calculation in the pilots was helped by having access to recorded historical cost data and that accuracy may be more difficult to achieve in a forward-looking assessment). However, questions were raised **whether the calculation should be conducted from the perspective of an individual farmer or from the perspective of the first gathering point** (e.g. mill or company aggregating the feedstock). This should be clarified in the methodology. It is common for EC-recognised voluntary schemes to certify the first gathering point (and the farmers are certified within the scope of the first gathering point certification). In the case of the Uruguay pilot, UPM Biofuels is the existing certified entity and the farmers who supply them are audited within the scope of the UPM certification. As the farmers are under annual contracts, the exact farmers producing Brassica carinata and being part of the audit each year can vary. As the farmers are all producing similar crops in a similar geographical area and all implementing the same additionality measure, it is appropriate to treat this as group certification and allow for the additionality test to be carried out from UPM's perspective. (See section 3.7 on group certification. The dynamic yield baseline and calculation of additional biomass should still be at the individual farm (plot) level.)

Related to this, in the case of both Colombian palm pilots, the NPV was calculated based on crude palm oil (CPO) prices (i.e. after feedstock processing at the mill), rather than fresh fruit bunch (FFB) prices (i.e. directly after harvest). The reason for using CPO price was because the plantations and mills are integrated into one business, so actual FFB prices were not available (an average market price could have been used if necessary, but this would not necessarily reflect their business reality). The pilot participants also argued that doing the calculation based on CPO prices better reflects actual profitability of investments in yield improvement practices. For these types of first gathering point set-ups, financial attractiveness may be better assessed on processed feedstocks rather than directly post-harvest.

Discount rates used by economic operators varied significantly, and in most cases were higher than the values given in the guidance. The discount rates to be used in the calculation are stipulated in the Implementing Regulation 2022/996 (and referred to in the certification guidance). Both the phase 1 Malaysia and Colombia pilots said the typical discount rates they would use are substantially higher than the rate suggested in the guidance. The Malaysian phase 1 pilot used 7-12% while the Colombian phase 1 pilot used 16%. Although neither case would pass the financial attractiveness test with those higher discount rates, it is anticipated that in other cases, higher discount rates could bring the NPV low enough to successfully pass the test. Whilst the current guidance rates appear to be low compared to rates that a business might use and especially low in today's context with high inflation rates, we would still recommend that a standard discount rate is prescribed to avoid that auditors have to make a judgement on the appropriateness of the rate chosen by an economic operator.

Conclusion

Several fundamental issues were encountered during the implementation of the financial attractiveness test. All the phase 1 pilot projects resulted in a positive NPV, which means none of them would pass the financial attractiveness test with the current methodology. This is in part explained by the fact that all the pilots had already implemented their additionality measures, so it is logical that the yield increase investments were profitable for the companies or their investors[41] regardless of the possibility to apply for low ILUC-risk certification. Measures would not have been implemented if the investors were not confident that the investment would be repaid.

For the financial attractiveness test to work in practice then, a clear and transparent price premium for low ILUC-risk feedstocks will need to develop. When the mechanism is initially rolled out, economic operators will need to have confidence that a premium will develop. Some project participants expressed a concern that the methodology **should not create a mechanism that incentivises only the most expensive and/or unprofitable measures**, but this must be balanced against the need to identify truly additional feedstock production.

The financial attractiveness test itself did not raise a significant number of comments during the stakeholder consultation at the end of phase 1. However, three important issues were highlighted:

- **In its current form, the financial benefits of low ILUC-risk certification are uncertain.** The exact financial benefits from low ILUC-risk certification are unknown (e.g. additional revenues or price premium for low ILUC-risk feedstocks). The mechanism is not yet implemented and there is no guarantee that a market premium will develop and will, for example, compensate for extra costs. Farmers will be reluctant to make an investment with an NPV that is negative on paper without confidence that they will receive a return on that investment.

- **Any price premium might not be transferred to farmers**. If and when a financial benefit (e.g. price premium) develops for low ILUC-risk *biofuels*, it is unclear what fraction of such benefits will be passed through the supply chain and realised on the price paid to the farm or plantation for the low ILUC-risk *feedstocks*. Such a premium will likely be collected at the end of the supply chain by biofuel producers or retailers who often do not have a direct relationship with the feedstock producer. Farmers will only invest in additionality measures that have a negative NPV if they expect to receive a benefit from doing so, either directly through increased feedstock prices or

[41] Pilot project operators in Colombia reported that the capital investments made were significant and would likely not having been made without guarantees over their profitability (regardless of low ILUC-risk certification).

perhaps indirectly because they do so to continue to e.g. supply a certain customer. In many set ups, the first gathering point sets the framework for how farmers are cultivating crops and make relevant management decisions via the contract. Still in that set up a first gathering point will have to provide some clear incentive to a farmer to persuade them to take a measure that would otherwise have a negative NPV.

- **Non-high ILUC-risk feedstocks do not currently benefit directly from the certification**. Whereas low ILUC-risk certification has a direct policy incentive mechanism under the REDII for high ILUC-risk feedstock producers wanting to avoid the phase-out of high ILUC-risk fuels, no specific incentive (i.e. concrete benefits from policy) exist currently for non-high ILUC-risk feedstocks to undergo low ILUC-risk certification. This makes it conceptually very hard for yield increase projects related to non-high ILUC-risk feedstocks to pass the financial attractiveness test. With the current policy framework, the adoption of low ILUC-risk certification may therefore be very limited except for feedstocks identified as having high ILUC-risk.

We note that there is a fundamental difference between the financial assessment of additionality in some projects certified under the CDM mechanism as compared to projects under the low ILUC-risk certification (as described in the feedstock expansion report). Some CDM projects involve an increase in operational costs with no increase in the quantity of the end product produced and therefore no change in revenue except the revenue from CDM credit sales. An example of this sort of project would be nitrous oxide destruction at an adipic acid plant. Such a project relies on income from the carbon credits generated to be profitable. However, a measure to increase yield of a crop should result in an increase in volume of the end product (the crop). Therefore the investment should lead to a revenue increase for farmers from increased sales as well as from any "low ILUC credits". This is more comparable to CDM projects such as hydro dams that involve production and sale of additional energy as well as credit revenues, and where concerns have been raised about the implementation of additionality testing.[42] If the revenue from expected increased sales is significant compared to the costs incurred, then an NPV calculation may indicate that these measures could be financially attractive and would therefore fail the additionality test. However, potentially profitable yield increase measures (even simply implementing best agricultural practices) are not always implemented and farm yields are not always reaching their full potential, which suggests **other non-financial barriers exist that are preventing the farmer from reaching their yield potential.** The barrier analysis will therefore be a relevant test to conduct in many cases concerning low ILUC-risk certification.

3.2.2 Barrier analysis

Were (non-financial) barriers identified?		
Pilot	**Availability and reliability of evidence**	**Accuracy of the resulting barrier analysis**
Overall	Barriers were described qualitatively by most pilots with different levels of evidence to support the barrier.	Auditors were unsure how to judge the validity of the barrier described. Auditors found it hard to determine what type of evidence was needed to pass the barrier analysis. Especially because all measures were taken in the past.

[42] E.g. https://papers.ssrn.com/sol3/papers.cfm?abstract_id=2120862

Malaysia – 1	Barriers were described but unclear how to demonstrate they applied in that situation.	Unclear to the auditor how to determine the validity of the barriers objectively. Link to EU biofuels was not made.
Malaysia – 2	Qualitative descriptions of the barriers were available and some evidence available.	Not applicable as small holders are exempt from the additionality test.
Colombia – 2	Barriers were described and evidence was available.	The auditor could verify the evidence and identified they overcome the FOAK barrier. However, the link to EU biofuels was lacking.
Uruguay	Barriers were described and evidence was available.	The auditor found the barrier analysis hard to interpret and did not feel confident whether the barrier test was passed. The consortium considers this example would pass the barrier test.
Brazil	Barrier description was very limited, no evidence was provided.	The auditor did not feel confident to judge whether the additionality measures passed the additionality test because too little evidence was provided.

All pilot participants were asked about barriers to yield increase in both phases of the project for all pilots, except the ones on abandoned and severely degraded land which are exempt. In phase 1, several pilot projects led to the conclusion that (non-financial) barriers represented more of an obstacle for farmers to increase their yields than the lack of financial attractiveness, but further guidance was required on how to more objectively judge the barrier test. Phase 2 therefore aimed to look more in depth at how the barrier analysis can be made more objective for auditors to robustly verify whether a project passes the test.

Phase 2 also aimed to explore the barriers faced by small and medium sized farmers and whether these are likely to be different to the types of barriers faced by the larger companies taking part in the pilot projects. The Malaysia phase 2 pilot specifically also tested the barrier analysis in the context of group certification.

Availability and reliability of evidence

Many of the pilot farmers struggled to precisely define barriers to yield increase and to judge which barriers would be eligible to pass the additionality test. In several of the cases barriers were described but the pilot participant missed being able to provide evidence to support that the barrier applies to their specific situation (noting that the additionality measures had been taken in the past, so the barriers had already been overcome). Barriers that were identified include: limited access to specialist agronomic expertise, access to labour, skills, tools, or legal restrictions.

As shown in the table above, some farmers were able to describe their barriers in a qualitative way. The Uruguay phase 1 pilot, Colombia phase 2 pilot and in some cases in the Malaysia phase 2 pilot, the economic operators were also able to provide reliable evidence to the auditors to show the barrier was applicable in that situation. In the case of Uruguay,

there was no existing market for Brassica carinata and seeds were not commonly available on the market. UPM provide access to seeds, knowledge and a route to market to the farmers, to enable the farmers to overcome the barriers. Evidence presented included contracts with farmers. For Colombia phase 2, the measure was an innovative "first-of-a-kind" approach to pollination. The pilot participant could provide detailed information and evidence related to the research budgets and testing programs to develop the measure. The Malaysia phase 2 pilot worked with a group of small farmers who experienced different barriers and had taken different measures. Whilst some of those farmers would be exempt from the barrier test because they are small holders less than 2ha, some of the group were anyway able to describe how they gained knowledge about the "Bio Farm Programme" from the central office and how they were offered access to finance to buy fertilisers, as examples. Apart from the Uruguay case, evidence was however not provided of the link to EU biofuels to overcome the barrier, which is an important step to truly prove additionality (this can also be logical because the measures had already been taken and so were not driven by EU biofuels).

Accuracy of the resulting barrier analysis

Generally, the barrier analysis was deemed to be subjective and open for interpretation by both the pilot participants and the auditors. The auditors often did not feel confident deciding whether or not the barrier test was passed. For the Malaysia phase 1 pilot, barriers were described, but evidence was lacking to prove that the barriers applied in that situation, so the auditor was not clear how to judge the barrier analysis. In the Uruguay pilot, it was unclear whether the barrier analysis should be done from UPM's perspective (the biofuel producer that supports the pilot and purchases feedstock from the farmers) or from the farmer perspective. A barrier can in theory apply to a farmer or first gathering point, so the barrier test can be done from either perspective and either might be relevant depending on the barrier or specific situation. After receiving the auditor's report, the project team discussed the case further and would consider the presented evidence accurate and sufficient to pass the barrier analysis, as both the barrier (lack of knowledge and lack of access to market) and the connection to the EU biofuels market could be proven.

The phase 2 Colombia pilot had sufficient reliable evidence to confirm the validity of the barrier analysis. The pilot concluded that the additionality measure carried out was first of a kind (FOAK) and could therefore be considered to pass the barrier analysis. However, uncertainty remains around the definition of to what extent measures can be counted as a FOAK and when the claim of a FOAK measure should be limited.

For the phase 2 Malaysia pilot, some of the farmers in the group could present evidence of valid barriers (although the link to EU biofuels was difficult to make). As there was a mixed group who experienced different barriers and took different additionality measures, the auditor did not feel confident to make a conclusive decision on which farmers passed and which not during the audit. Conducting the barrier analysis in this pilot was only for the benefit of the project learning, as small holders are exempt from the additionality test.

Several issues were identified in the barrier analysis, mostly related to the qualitative nature of the barriers that makes it difficult to accurately assess them. Auditors needed to use qualitative descriptions to confirm whether the identified barriers can be considered valid, and whether the barriers apply in that specific case, to the specific farm, which did not allow for objective conclusions. The quality of the barrier analysis therefore relies on the expertise and experience of the auditor. Particularly, the economic operators said they required further information on the type of barriers that could be eligible, because there is not unified, objective definition of common practices as a baseline to evaluate against.

Furthermore, farmers found it hard to provide evidence that the additionality measure was implemented to produce additional biomass **for the EU biofuels market.** Trying to prove the link to EU biofuels is considered inherently and conceptually difficult when it concerns an independent farmer producing a commodity crop in a global market. Even if farmers have contracts to supply feedstock to specific EU biofuel producers, it may not be obvious how they can demonstrate that access to that market enabled an additionality measure. Where low ILUC-risk material is produced without a pre-established offtaker it may be even more difficult to establish the link. More guidance on how the link to the EU biofuels market can be proven is added to the certification guidance to support farmers in the process.

Proving the link to EU biofuels is important to ensure the mechanism is only certifying measures that would not have happened anyway. This could create a potential lack of fairness issue in that the same intervention overcoming the same barrier could be made by a local company or an EU biofuels company, and it would be easier for the EU biofuels company to prove that the barrier was overcome because of EU biofuels than for the local company. Auditors should keep in mind that what needs to be demonstrated is to show that the adoption of an additionality measure was made possible by the value signal from the EU biofuel market and it does not have to be the case that only an intervention by an EU biofuels company can demonstrate this.

The need for further guidance was echoed in the stakeholder consultation. Several stakeholders commented that there was a lack of clarity on evidence requirements. Stakeholders suggested avoiding the use of non-specific wording such as “satisfactory evidence” or “common practice” and suggested that the evidence requirements were not specific enough.

The Implementing Regulation 2022/996 states that: “any barrier whose cost can be estimated shall be included in the financial attractiveness rather than in the non-financial barrier analysis”. Several stakeholders commented on the concept of (non-financial) barriers, suggesting that most, if not all, examples provided in the guidance could ultimately be translated to financial barriers. A more nuanced approached would be beneficial to clarify the differences between the two options for the additionality test.

Conclusion

To pass the barrier test, economic operators have to describe a barrier, prove that it is relevant in that situation and prove that the barrier is overcome because of a link to the EU biofuels market. Examples are added to the certification guidance of barriers and types of evidence to prove the link to the EU biofuels market. These examples aim to make the barrier analysis more objective and easier to implement. Nevertheless, the barrier analysis will rely on the auditors’ professional experience and confidence with the approach to ensure the test is robustly implemented. It will be important for Certification Bodies and voluntary schemes to share experiences with the barrier analysis to learn from implementation of the approach in practice, with a view to improving the objectivity and robustness of the guidance over time.

Annex VIII of Implementing Regulation 2022/996 states that **“**any barrier whose cost can be estimated shall be included in the financial attractiveness analysis.” However, there are many barriers preventing farmers from optimising their yields and especially small farms do not always make decisions based purely on financial considerations. Therefore, a more nuanced approach could be considered, so that the financial attractiveness test is used where costs can *reasonably* be estimated, and flexibility should be allowed for economic operators to use the barrier analysis test if it can objectively be proven, even if it is in theory possible to put a cost on a measure.

3.3 Dynamic yield baseline and additional biomass

This section presents the findings from the pilots related to the methodologies to determine the **dynamic yield baseline** and to calculate the subsequent **additional biomass** (called 'additional feedstock' in Delegated Regulation 2019/807). The methodology applied differs, depending on the crop or cultivation type – perennial crops, annual crops and sequential cropping (intermediate cropping). The relevant definitions from Delegated Regulation 2019/807 are included below.

Definitions

Delegated Regulation 2019/807 Article 2(6)

'**additional feedstock**' means the additional amount of a food and feed crop produced in a clearly delineated area compared to the dynamic yield baseline and that is the direct result of applying an additionality measure;

Delegated Regulation 2019/807 Article 2(7)

'**dynamic yield baseline**' means the average yield from the delineated area where an additionality measure has been taken, calculated over the 3-year period immediately preceding the year of the application of such measure, taking into account the average yield increase observed for that feedstock over the previous decade and the yield curves over the life time in case of permanent crops, excluding yield fluctuations;

The dynamic yield baseline and additional biomass were calculated for all the yield increase pilots (i.e. all pilots except the abandoned land and severely degraded land pilots). The Malaysia and Colombia pilots in both phases focused on oil palm, which is a perennial crop. The Brazil phase 2 pilot focused on soy – an annual crop – and the France (both phases) and Uruguay (phase 1) pilots focused on sequential cropping.[43]

Could a dynamic yield baseline be reliably calculated?		
Pilot	**Availability and reliability of data**	**Accuracy of the resulting yield baseline**
Overall	Good quality yield data available for all the pilots, and for some pilots yield data was available per sub-plot. Some plot-by-plot variation in baselines observed.	Accurate baselines calculated for some of the pilots, but the scale of weather impacts and data variations caused concerns for the robustness of the baselines calculated for some pilots.

[43] In this project we defined "sequential cropping" as growing a second crop, before or after a main crop, on the same agricultural land, when the land would have been fallow. This approach therefore produces additional biomass on existing agricultural land. The term sequential cropping is not used in the RED, but the concept is very similar to intermediate crops, which are exempt from the food and feed cap and proposed for inclusion in Annex IX Part B. Article 2(40) of the REDII explicitly excludes from the food and feed cap "[…] intermediate crops, such as catch crops and cover crops, provided that the use of such intermediate crops does not trigger demand for additional land". These pilots have therefore also been used to provide insights into how intermediate crops could be implemented in the wider context of the REDII.

Malaysia – 1		Very granular sub-plot level yield data available. Large variability between sub-plots.		Option 1A and 1B baseline methodologies led to different results. Impact of weather was larger than the impact of the additionality measures.
Malaysia – 2		Historic yield data was collected and recorded for individual farms within the group certification, based on established recording procedure that has been in place since the start of voluntary scheme certification. Some variation in data quality was observed within the group. Several yield outliers in the data could not be verified.		Farmers within the group had very different historical yields, despite all being in the same region. Outliers in the data raised concerns over accuracy and robustness of some of the farmer's baselines. Outliers were removed to calculate a baseline per farm, using Option 1A.
Colombia – 1		Information system and yield data back to 2016		Only small difference between baselines calculated using option 1A and 1B
Colombia – 2		Plot-by-plot FFB yield data was collected back to 2010. Oil-based yield not available on a plot-by-plot basis.		Baseline calculated using option 1A for both FFB and total oil yield.
Uruguay		Yield data was available because the farms are part of the UPM programme, but concern raised that farmland is rented so new farmers to the programme might not have ready access to historical yield data		The years chosen to include in the baseline have an impact. Some difference between approaches tested based on different units.
France – 1		The CAP ensures detailed maps, identifying the crops grown at parcel level, are commonly available		Complex crop rotation patterns made it not possible to use some of the methodologies. Significant differences between all methods tested in phase 1
France – 2		Crop-specific yield data was available, but sometimes only at farm level (whereas sequential cropping was only implemented on certain fields)		For site 1, three approaches were used which varied in complexity but resulted in similar baselines For site 2, the data was available, and the baseline was straightforward to calculate
Brazil		Some yield data was available, but the farmer reported it in different units and it was not always clear which crop the data referred to		The baseline calculation was conducted but detailed calculations were not shared with the project team. Several additionality measures were implemented over multiple years, making it hard to define a starting year for the baseline.

Could a dynamic yield baseline be reliably calculated?

Availability and reliability of data

Good quality historical yield data were available for almost all the pilots. All the pilots were able to follow the dynamic yield baseline calculation approach, using historical yield data specific to their situation. It was possible to follow the methodologies set out in the certification guidance to calculate a dynamic yield baseline in all cases, although especially for sequential cropping in phase 1 challenges were identified in the methodologies related to different crop rotations, which led to a revised approach to determine the baseline for sequential cropping in phase 2.

Auditors were mostly able to verify the underlying yield data and link it back to the plot where the additionality measure is taken, although some challenges were identified. In several of the pilots, very granular (sub-)plot or field level yield data was available which made it possible to link the yield data back to the specific plot of land where the additionality measure was taken. However, in other cases yield data was only available for the whole farm/plantation which covers several sub-plots or fields. This can work for the dynamic yield baseline calculation, especially if the additionality measure is taken across the whole plantation, such as the new irrigation system in the Colombia phase 1 pilot. However, in other situations, this may make it difficult to isolate the specific yield impact of the measure. For example, this was an issue in particular for the French sequential cropping pilots in phase 2 where sequential cropping was only conducted on 10% of the farm. Whilst farm-specific data could be used, this did present a challenge to isolate the specific yield impact of sequential cropping on the main crop at a field level. In the pilot, an approach was also tried using regional data to substitute for farm specific data where this was missing, but this did not lead to a more accurate result.

For the Malaysia phase 2 group certification pilot, the central office (group leader) systematically collected and recorded historical yield data for individual farms within the group. The procedure was well established and has been in place since the start of voluntary scheme certification. The procedure identifies yield outliers, which are then marked in the system and followed up and checked with the individual farmers. However, there was variation in data quality observed within the group and several yield outliers in the data whilst identified, could not be corrected or verified. This presented a challenge to determine an accurate baseline for some members of the group. There was a large variation in yields achieved between members of the group, so a group average baseline would not give an accurate comparison of yields before and after additionality measures.

It should be noted that data availability was part of the rationale for selecting some of the pilot companies. Most were already certified to a voluntary scheme, a pre-requisite for which is that economic operators have systems in place to monitor core information. Furthermore, most of the pilot companies had already engaged in activities to improve their yields before the study started. It is therefore likely that such good data availability and granularity is not necessarily representative of all farmers. Consequently, we assume that the pilots represent "best in class" operations as far as data availability and reliability is concerned.

This is particularly the case for historic yield data, which may not be readily accessible, especially for farmers who rent their farmland on short-term contracts. Several pilot companies also questioned whether parties that are not already certified to a voluntary scheme would have the necessary data readily available. As low ILUC certification is designed to be an add-on to current certification schemes, it is likely that most applicants would already have the data needed, although this would present a challenge if a party wants to become low ILUC certified as part of their first entry into sustainability certification.

Farms located in the European Union are likely to maintain a good level of data availability and reliability, since compliance with the Common Agricultural Policy requires detailed crop data to be kept at parcel level.

Accuracy of the resulting yield baseline

Observed natural variation in yield is significant. The pilots (and feedback from the stakeholder consultation) highlighted concerns over how impacts of weather or other natural variations in yields can be dealt with. The scale of weather impacts and data variations in several of the pilots – especially in both Malaysia pilots and the French pilots – caused concerns over the robustness of the baselines calculated. Natural variation in yield is an expected and unavoidable occurrence in agriculture. There will always be yield variations due to changing external abiotic and biotic factors (e.g. weather conditions, pests, etc.) and it will never be possible to exactly differentiate the contribution of these different factors and/ or changing management practices to yield increase. The dynamic yield baseline is calculated using yields from a 3-year period in an aim to smooth out natural variations. However the pilots did highlight variations in the baselines, depending on the years of historical yields chosen. The differences in baseline – and consequently the differences in additional biomass volumes that could be claimed – were significant. In one case, the impact of weather on the yield was larger than the impact of the additionality measure. Although, it should be noted that this may also be because the some of the yield increase measures tested had a relatively marginal impact on the observed yield. Robustly certifying marginal increases in yield is challenging for that reason. Especially if yield increases are marginal, over the 10-year validity of low ILUC certification, there will inevitably be some years when weather conditions mean no low ILUC biomass can be claimed because observed yields are below the baseline. This makes the low ILUC mechanism uncertain for farmers, as they will not reliably know up-front how much they will be able to claim, but in the consortium's view, it still remains more "accurate" in terms of claiming additional biomass due to specific additionality measures to calculate a baseline and additional biomass at a farm level, rather than using e.g. regional averages.

One approach to tackle this and remove some of the uncertainty for farmers in whether they can claim low ILUC biomass suggested by stakeholders was to allow farmers who have implemented an additionality measure to claim a certain amount of low ILUC biomass each year, to avoid a situation where they take a measure, but due to factors outside their control (e.g. weather) they are not able to claim any low ILUC biomass in some years. However, this approach would require a detailed register of "default" or expected yield increase values for different measures and different crops in different regions. No such register or literature is available. Furthermore, the low ILUC approach aims to allow operators to claim actual observed increases in yield. Therefore, retaining an approach based on calculating additional biomass by comparing observed yields to a baseline determined at a farm level is the preferred and more practical approach.

Combinations of additionality measures taken in the past can make it hard to set a clear baseline. In the Brazilian soy pilot, different combinations of several yield increase measures had been tried and tested over time. This made it hard to identify one clear start year when it could be considered that additionality measure(s) were introduced and the baseline should start.

Pilot participants often made errors implementing the global trendline or "slope" element of baseline. Across the board, pilot participants experienced difficulties, made mistakes or simply missed out applying the global trendline – or "slope" – element of the dynamic yield baseline. The concept was often not clear to the pilot participants – both from the perspective of correctly applying the slope to calculate the baseline and from the perspective of understanding the justification for why a global trendline should be applied to

"their farm yields". For palm especially, farmers argued that the perennial nature of the crop means that they have limited options to increase the yield of already planted oil palms.

The experience from the pilots showed that the global trendline makes only a small difference to the absolute level of the baseline. Removing the slope step within the dynamic yield baseline calculation would therefore not significantly change the accuracy of the results but would significantly simplify the methodology. The European Commission could consider removing the slope step from future updates to the legislation to reduce the administrative burden and the risk of mistakes in the calculation and verification. However, in the meantime as the concept of including a yield trendline in the baseline calculation is clearly set out in the Delegated Regulation and important to ensure that the mechanism only counts biomass that would not have otherwise been produced in a business as usual scenario. The certification guidance seeks to provide clear calculation steps and worked examples for operators on how to set the dynamic yield baseline, to ensure the methodology is clear and the steps can be easily followed. Auditors should be vigilant to check that calculations are conducted correctly using accurate yield data.

The following issues were raised during the stakeholder consultation, specific to **perennial crop baselines**:

- **Perennial crops other than palm lack data:** Two respondents to the stakeholder consultation commented that the application of the methodology in setting the baseline is not fully defined for perennial crops other than palm. They asked how the methodology would be applied to other perennial crops (e.g., coconut or pongamia). A normalised standard growth curve is needed to set a dynamic yield baseline for yield increase projects involving perennial crops. Currently the guidance only includes a standard growth curve for palm, as this is the only high ILUC-risk feedstock at present. If there is demand to certify yield increase projects for other perennial crops, we recommend that the European Commission either provides the standard growth curves for these crops or delegates the provision of the standard growth curves to the voluntary schemes as part of the low ILUC-risk certification process.

- **Methodology for semi-perennial crops is unclear:** Two respondents to the stakeholder consultation commented that the application of the methodology in setting the dynamic yield baseline is not fully defined for semi-perennial crops. They asked how the methodology would be applied to semi-perennial (e.g., sugarcane) crops with long lifecycles. The guidance currently suggests that sugar cane shall be treated as an annual crop by taking an average of the 3 latest years of data.

The following issues were identified during the project that affect **sequential crops** (see section 0 for an overview of all main challenges):

- **Crop rotation patterns affect the baseline calculation**: The pilots on sequential cropping reveal that even quite common crop rotation patterns can lead to complexities in setting a baseline, for example if the order of crops in the rotation is not consistent or rotations include several different types of crops. The baselines varied significantly with the calculation approach and the crop rotation of the previous years. For France pilots especially, the complexity of the crop rotation made it difficult to determine which crop yields should be included in the baseline calculation. The chosen baseline period, rotation pattern, and the type of crops included in baseline calculation led to different results for the baseline. In addition, rotations are implemented over several plots at a given moment in time. Therefore, a given plot may undergo different main and sequential crops over a 2 to 3 year cycle, which means that a constant annual pattern could not be used to calculate a dynamic yield

baseline and/or additional biomass for a specific plot. It is recommended to revert to an approach where the baseline for the secondary crop in a sequential cropping system is zero if no second crop was previously grown (i.e. before the implementation of low ILUC measures), but takes into account any impact on yield of the main crop.

  - In the phase 1 France pilot, one calculation method was based on the full crop rotation yields and another based on the yield of the crop (rapeseed) that was replaced in the rotation by the sequential crop (and a different main crop) in the test year. The latter method de facto excluded yields from the cereals in the rotation in the baseline, therefore resulting in a lower baseline and significantly higher additional biomass.

  - In the phase 2 France pilot, some yield data points were missing, meaning that corrected regional average data had to be used to set the baseline, following the draft guidance document methodology. However, setting a baseline by combining available farm data with regional averages which were corrected to align with farm performance was complex and did not necessarily add accuracy to the calculation. Simply taking the average of the last 3 years of regional data gave similar results and was much more straightforward.

  - In the Uruguay pilot, the farmer had grown a winter cereal crop in some previous years, which – if it would have been included in the baseline calculation – would have significantly increased the baseline and therefore decreased the volume of additional biomass.

- **Definition of main and intermediate crop:** Several respondents to the stakeholder consultation suggested that the distinction between “main crop” and “sequential crop / intermediate crop” should be better defined. Stakeholder asked how well-established double-cropping in some regions of the world would be treated, for example soybean and corn rotations in Brazil. Implementation of sequential cropping as an additionality measure requires a clear definition of the main and sequential crop. This is relevant for low ILUC certification, but also for other aspects of the REDII including exemption for intermediate crops from the food and feed cap and inclusion of certain categories of crops in Annex IX.

Could additional biomass following the additionality measure be reliably calculated? Does the additional biomass represent a “real” increase compared to business as usual?		
Pilot	**Availability and reliability of data**	**Accuracy of the resulting yield increase**
Overall	Good quality yield data available for all the pilots. For some pilots, yield data was available per sub-plot whereas for others (e.g. France phase 2) yield data was only available at farm level.	The pilots found differences in the yield increase calculation, depending on the methodology used. Significant natural variation in yields means it is hard to attribute yield increase directly to a yield increase measure.

Malaysia – 1	Sub-plot level yield data available and pilot company preferred to do calculations on sub-plot level, also because the yield increase measures were taken at different times on different sub-plots.	Additional biomass calculations were done at sub-plot level. High natural variation in yield meant in some years the impact of weather was larger than the impact of the additionality measures, so it would not be possible to claim low ILUC biomass every year, but the calculation was judged to be accurate.
Malaysia – 2	Yield data was collected and recorded for individual farms within the group certification, although some variation in data quality was observed.	Outliers in the historical data made it hard to accurately calculate additional biomass for some group members.
Colombia – 1	Historical yield data was available from before and after implementation of the additionality measure, because the measure was already implemented	Calculation could be conducted accurately for the area that was impacted by the additionality measure. Full impact of yield increase expected to show in the data from the year after the pilot (2021 onwards)
Colombia – 2	FFB and oil-based yield data available. Both units were used to calculate a baseline and additional biomass.	The additional biomass calculation was accurate. The oil-based data was felt to be most accurate as that reflected the yield increase of usable product for biofuel, whilst also accounting for the loss in palm kernel oil. The yield was found to be below the baseline for 2020 and 2021. Therefore, no yield increase was found in this period, but the expectation is that from 2022 onwards, yields will surpass the baseline.
Uruguay	Good quality yield data available because farms are part of UPM programme. Crop rotation pattern is relatively simple and additional biomass calculations could be conducted using different units.	Differences in the results using different units
France – 1	Granular yield data available (parcel level)	Different methods resulted in different results. Some methodologies were not possible to use.
France – 2	Sequential cropping was not deployed on all fields, therefore any impact on main crop yields due to sequential cropping is not fully illustrated by the farm level data available.	For site 1, a decrease in main crop yield was observed even though the sequential crop did not change the growing period of the main crop. Significant natural variation in main crop yields observed. For site 2, option 2b was applied to calculate the additional biomass, using a percentage and absolute value for compensation, as well as energy units. These gave similar results.

Brazil	Yield data was not transparent and not all necessary yield data was reported	The pilot reported a large additional biomass, but it was not clear that this was a direct cause of the reported additionality measure

Could additional biomass following the additionality measure be reliably calculated? Does the yield increase represent a "real" increase compared to business as usual?

Availability and reliability of data

The available yield data allowed pilot companies to calculate additional biomass as per the methodologies described in the certification guidance. Yield outliers were identified in some pilots and these were removed to come to a more accurate baseline. However, this meant in some cases there was not enough data to set a baseline (especially within the Malaysia phase 2 group certification). In some cases, where the additionality measure was not taken across the whole farm, then farm level yield data does not only show the impact of the yield increase measure.

In addition, non-ILUC related practices or weather events contribute to high variation in yields. Data is not available to distinguish the contribution of purposefully implemented low ILUC practices from other external influences on yield, such as weather.

Accuracy of the resulting yield increase

The different calculation methods within perennial crops and sequential cropping did bring variability in the calculations of additional biomass when the pilots tested multiple methods. Variability can be problematic on the accuracy and reliability of the low ILUC biomass volume claimed. (See section 0 for an overview of all main challenges):

Chosen calculation methodology brings different results: The different calculation approaches resulted in varying baselines and consequently varying levels of additional biomass, which could incentivise operators to choose the most favourable approach, i.e., the method providing the lowest possible baseline and the highest possible additional biomass. This could also lead to an uneven playing field between economic operators, as those with greater data access may be advantaged.

This can be seen from the yield increase varied with the baseline calculation approach so that different additional biomass was calculated following Option 1A or 1B in the Malaysian phase 1 pilot. The average growth curve in Option 1A and the growth curve provided by the economic operator in Option 1B varied slightly, mainly in the first four years of growth. This difference in the baseline resulted in differing volumes of additional biomass. Conversely, the yield increase variance between the calculation options was not as significant in the phase 1 Colombia pilot. Based on the pilot projects, Option 1A for the calculation of a dynamic yield baseline for perennial crop plantations is more consistent, therefore, Option 1B should only be accepted in exceptional circumstances. For palm, the guidance will recommend that option 1A, using the standard palm growth curve, is used to determine the shape of the baseline curve in that majority of cases. Option 1B should only be used in exceptional cases, to minimise variation in approaches. Option 2 – to set the baseline at a group or first gathering point level – can be used when there is an even age profile of trees in the group or plantation over time and the same additionality measure is taken across the whole group or plantation.

Different units for additional biomass bring different results. The unit used for the calculation of historical yields and dynamic yield baseline is in tonnes/ha, which is appropriate for the aggregation and comparison of biomass outputs of the **same crop type**. However, there are some cases where this is not the most appropriate unit.

In the case of the Colombian phase 2 pilot plantation, the additionality measure increased the crude palm oil (CPO) yield disproportionately more than the weight of the fresh fruit bunches (FFB), therefore doing the calculations on the basis of FFB weight did not reflect the full increase in the usable product (CPO) as a result of the additionality measure. However, the measure also directly causes a decrease in palm kernel oil (PKO), as the fruit fertilised by NAA does not contain a kernel. Therefore in the pilot, the calculations were conducted on the basis of **total oil** to take both these factors into account. For crops like palm, in which the main and co-products are both the same type of product (oils), compensating for the loss in PKO by doing the calculation on the basis of total tonnes oil is relatively straightforward from a calculation perspective. It is noted that CPO and PKO are used for different purposes and there can be market consequences as CPO is not a direct replacement for PKO. However, this approach to compensate the PKO loss strikes the balance between robustness of the calculation and ease of implementation. If the co-products are different in nature (e.g. soy produces oil and protein yields) and significant in output (e.g. more than 10% of the valuable products are co-products not used for biofuel), the baseline and additional biomass analysis should be done on the basis of the raw material harvested. The certification guidance will allow the option for economic operator to conduct the calculations on the basis of the mass of the final usable product (e.g. crude palm oil), as long as impacts on other co-products are taken into account.

The sequential cropping pilots face the additional challenge that they are conducting the calculations with yield data from different crop types. Therefore, using different units as the basis of comparison may be more appropriate, given different expected yields and component values of the different crops in a rotation. The pilots tested several different approaches in phase 1 and phase 2 (such as mass, energy content or crop component content, e.g., starch, oil or protein) and found variation in the results when different units or approaches are used. The Uruguay pilot project calculated additional biomass ranging from 7% to 103% of the biomass baseline depending on the calculation approach. However, the variation is not consistent across pilots as the differences are heavily dependent on which types of crops are involved in the rotation (e.g. oil seeds, cereals or pulses). When there are different crops involved in a rotation, and one crop influences the yield of another, there can never be a perfect substitution or compensation. Different crops have different components (e.g. oils versus protein versus starch) and even within the same crop types, different oils or proteins for example have different properties and markets. It is therefore hard to identify an approach that is “the best” at giving a meaningful characterisation of the change in productivity of the system across all sequential cropping scenarios.

The crop component approach allows a better estimate of potential market effects of implementing low ILUC measures, as substitution of alternative feedstocks would be based on the respective economic value of their components. This, however, makes the approach complex by leading economic operators to look at multiple production outputs, both for the calculation of the dynamic yield baseline and additional biomass. This also requires customizing the approach to the different feedstock types, which in turn reduces the comparability of low ILUC biomass from different sources, especially as the different feedstocks have variable compositions. Evaluating additional biomass based on mass is considered to be the simplest approach, using data readily available to farmers, however different crops display very different yields in terms of mass, even if the comparison is done on a dry matter basis, so this was not considered to be the best characterisation of yield impact. Evaluating additional biomass based on energy content is considered to offer the

best basis for comparison as it offers the best balance between ease of calculation and applicability, as ultimately food and feed crops and crops used for energy are providing energy content to the market.

Crop cycle length-based assessment: A respondent to the stakeholder consultation suggested that average crop cycle lengths could be used to assess and certify sequential cropping instead of using a yield-based calculation to determine the yield impact of sequential cropping. This approach matches well with the findings from the pilot that, because of natural variation in yields, yield itself is not always a good indicator of whether the sequential crop has impacted the yield of the main crop. Main crop yields naturally vary year-by-year even without the introduction of sequential cropping. Therefore if an economic operator can demonstrate that the sequential crop does not change the crop cycle of the main crop, this could be an alternative approach to determine additional biomass for relevant cases of sequential cropping.

As for the baseline calculation, yield variations caused by external effects like weather are hard to disentangle from the impact of additionality measures. This makes it hard to truly claim that the additional biomass represents the "real" increase compared to business as usual caused by the additionality measures. The exact effect of non-low ILUC practices or natural events is difficult to disentangle from other yield increase measures. The most significant of these is weather, but there are other factors. For example, in the Malaysia phase 1 pilot, factors such as steepness of the plot and tree density also affected yield and cost of the yield increase measure. The amount of additional biomass being claimed as low ILUC is expected to vary considerably each year, based on natural events (e.g., rainfalls, drought, pathogens, etc.). This makes any kind of financial planning challenging, as the exact amount of extra revenue, and therefore potential investments, from low ILUC biomass cannot be reliably planned.

For perennial crops, additionality measures crops might take longer than one year to have an impact: The phase 1 Malaysia and Colombia pilots pointed out that, due to the perennial nature of the crop, it can take around two years after the implementation of the additionality measure to see the additional biomass effect. The pilot companies recommended that the company should be able to choose when their 10-year low ILUC claim period can start. This has been addressed in Implementing Regulation 2022/996 and the certification guidance.

3.4 Unused, abandoned and severely degraded lands

This section provides an overview of the findings from the pilots on **abandoned** and **severely degraded land**.

In phase 1 a pilot was conducted on abandoned land in Ukraine. In phase 2 a plot of potentially severely degraded land in Spain was investigated. (Note that no pilot was conducted on unused land that was neither abandoned nor severely degraded.) The relevant definitions from Delegated Regulation 2019/807 are included below:

Definitions

Delegated Regulation 2019/807 Article 2(2)

'**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;

Delegated Regulation 2019/807 Article 2(3)

'**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;

Directive 2018/2001 Annex V point (9)

'**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.

Furthermore, for severely degraded land, the draft low ILUC-risk certification guidance included specific thresholds to determine "significant" for severely degraded land that could be tested in the phase 2 pilot. These thresholds are:

- *"**Severely salinated soils** are defined as those having an electroconductivity (as measured by the saturated paste method) of more than **8 deci-siemens per metre (dS/m)**. The yield achievable from most crops is reduced at this level of salinisation. Electroconductivity at or above this threshold must be present on average within the rooting zone of **0-30cm depth** across at least **80% of the area** of the delineated site."*
- *"Soil should be considered to be low in soil organic matter, if organic matter of **less than 1%** is measured from **representative soil samples** taken from the delineated plot and tested by the dry combustion method, correcting as necessary for bulk density."*
- *"In the case of severe erosion, at least **25% of the delineated plot** shall have been eroded […]"*

3.4.1 Abandoned land

Could the land be reliably identified as abandoned?		
Pilot	**Availability and reliability of data**	**Accuracy of the identification**
Ukraine	Reliable satellite images available from 1986-2020, complemented with local interviews. Local archives did not have any documents available to demonstrate land was previously agricultural.	Many reliable indices to analyse satellite images, complemented with local interviews

Abandoned land was tested in the Ukraine pilot, in which the land could reliably be demonstrated as abandoned through satellite imaging analysis performed prior to the audit and verified through local interviews during the baseline audit. Satellite imaging could be used to demonstrate both the required >5 years of abandonment and presence/absence of intensive/extensive grazing. However, more data are required to demonstrate that a food or feed crop (as defined in REDII Article 40(2)) was previously grown on the land, and other methods would be needed to complement the analysis. This could be from local interviews.

Similarly, to identify intensive/extensive grazing**, the threshold is not clear when an area is used for "substantial" animal fodder.** This is left to the discretion of the auditor. Setting a fixed threshold for "substantial" is not recommended as it is likely to vary quite broadly per region and per type of animal so may be challenging in practice. From an ILUC perspective, it could be an important factor to consider whether there is other land available in the proximity for animals to graze, if displaced. These type of considerations for auditors could help guide them to make a decision.

Availability and reliability of data

The reported availability and reliability of data in the Ukraine pilot was good enough to perform the required analyses.

Readily and freely available Landsat images were used in this pilot. In general, the Normalized Difference Vegetation Index (NDVI) Index served well to demonstrate whether land was agricultural in the years studied. The observations were complemented with interviews of local people during the audit. In this particular case, local archives did not have any documents available to demonstrate land was previously agricultural as the land had been abandoned for more than 25 years (the period that the Ukrainian authorities keep records for). However, for shorter periods of abandonment this information should also be available from local archives.

Accuracy of the identification

Overall, the identification through satellite imaging was accurate, but some technical challenges have been encountered. For some years where only cloudy images were available, the NDVI Index could not be determined.

The satellite imaging method should be sufficient to show if and when the land was agricultural but may not always be sufficient to demonstrate whether food or feed crops were cultivated (as required by the definition of abandoned land). Local interviews were used in the pilots to complement satellite imaging analysis. Local archives were not available as they

are only kept for 25 years and the period of abandonment in this case was longer. They are more likely to be available for shorter periods of abandonment.

Other methods, such as soil sampling and environmental DNA sequencing, can demonstrate that a certain crop species was grown but are not able to demonstrate when those crop species were grown on the land.

Practical issues

Three challenges related to the identification of abandoned land were identified:

- **Low quality satellite imaging:** The satellite imaging analysis concluded that the plot of land turned from agricultural land to grassland over the period of 1986 to present day. Crop profiles were not determined in this pilot, as Landsat image quality from the 1980s was not sufficient.

  The challenge with the satellite imaging for the purpose of low ILUC-risk certification is that it is difficult to determine whether the former agricultural land specifically grew food or feed crops according to the REDII Article 2(40) definition. According to the Global Risk Assessment Service (GRAS), it is currently possible to identify the crop type through satellite imaging if sufficient data is available from neighbouring plots growing the same crop, as a direct comparison can be made. Further data from a country's relevant agricultural ministry on regional harvesting calendars and interviews with local community members could complement the satellite imagery.

- **Direct land use change emissions associated with converting abandoned land into agricultural land:** Any conversion of land must meet the core REDII sustainability criteria, including conversion of abandoned land to agricultural land. Some land use changes are permitted under the REDII, but any **direct** land use change (dLUC) emissions have to be taken into account in the associated GHG emissions calculation for the biofuel. Land that has been left abandoned for more than 5 years will have some re-growth and in the phase 1 pilot's case can even develop into a grassland over time. If dLUC emissions from conversion of a grassland (or continuously forested area <10% canopy cover) into agricultural land are included, the GHG savings requirement is unlikely to be met for any biofuel produced from the land. It may be possible in certain cases (for example, crops which are high yielding or have high aboveground carbon, such as oil palm or sugar beet, would in theory have a better chance of meeting the GHG saving threshold) but dLUC emissions will be an issue in many cases, especially if land has been abandoned for a long period of time.

- **Potential biodiversity concerns associated with converting land:** There could also be biodiversity concerns that would prevent land conversion meeting the core REDII sustainability criteria if the land has been abandoned for a long period and biodiversity or the vegetation have increased, especially if the ecological climax (ultimate vegetation stage) in a given region is forest. Biodiversity was not considered to be an issue for this plot of land in Ukraine, but could be in other contexts, regions or climates.

3.4.2 Severely degraded land

Could the land be reliably identified as severely degraded?		
Pilot	**Availability and reliability of data**	**Accuracy of the identification**
Spain – Soil organic matter	Taking of 67 samples and thorough analysis yielded reliable data on soil organic matter (SOM).	All samples were accurately analysed and did not pass the threshold.
Spain – Salination	Taking of 67 samples and thorough analysis yielded reliable data on salination.	All samples were accurately analysed and all did not pass the threshold.
Spain – Erosion	Farm was located in an erosion-risk area, but wind erosion is not directly visible from an on-site visit of the farm.	Not assessed because no defined measurement approach could be identified.

Availability and reliability of data

Good quality and reliable sampling data was taken and analysed. The pilot study team took 67 samples across the plot, including 43 shallow soil samples and 24 deep soil samples. Total analysis costs for the samples were €1,400 for the 67 samples and a full soil analysis was conducted for 32 of the samples. The analysis covered soil organic matter (SOM) and salination.

No measurement of erosion could be taken as there is no established approach to measure erosion. Many literature studies measure erosion in soil loss in t/ha/yr, however this not practical for farmers to conduct themselves as a routine measurement. Photographic evidence could be used to determine signs of erosion, but it would be difficult to prove through photographs that a minimum of 25% of the land was eroded. In the case of wind erosion, photographic evidence cannot be used as wind tends to erode a whole area more evenly than compared to, for example, water erosion.

Accuracy of the identification

Overall it was possible to follow the soil sampling protocol, take the required measurements, perform the laboratory analysis and audit the findings for SOM and salination. As noted above, whilst the pilot team looks for visual signs of erosion, the area was prone to wind erosion and as such no real visible signs were available. The farmer did not have data for erosion over time and therefore no data was available to measure erosion against a threshold.

The analysis of the soil samples showed a SOM between 2 and 3% on the pilot plot of land, thus exceeding the maximum 1% SOM threshold proposed for severely degraded land. If an alternative threshold of 1% soil organic carbon (SOC) was used, 3 samples would pass and a 2% SOC threshold would be passed by 81% of the shallow soil samples and all deep soil samples.

Of the 67 samples, 32 were tested for salinity but none of the samples were close to the 8 dS/m threshold proposed to count as significantly salinated. On average, the tested soil

had an electroconductivity of 0.18 dS/m, the maximum value being 0.25 dS/m. There was one outlier of 1.29 dS/m.

Based on the above, the analysis was conclusive in showing that the land was not severely degraded.

Practical issues

The following issues related to the identification of severely degraded land were identified:

- **No standard methodology to measure erosion in the field:** There is no standard approach to measuring erosion, therefore it is unclear how "severely eroded" can be proven. The pilot project suggested that erosion might be better suited to demonstration through the use of peer-reviewed erosion risk maps to indicate whether a farmer is located in a region with a high risk of erosion, such as erosion-risk maps provided by JRC or equivalent. (Note that high erosion risk would still have to be combined with a measured SOM below the proposed threshold to count as severely degraded land.)
- **Proposed thresholds are very strict:** Based on feedback received, the proposed SOM, salination and erosion thresholds are very strict, and it is unlikely that any cultivation would happen on lands that meet the proposed severely degraded land thresholds. An alternative approach would be to set more modest thresholds that allow for some cultivation, but also allow for improvement in soil quality. This would allow projects to qualify that are becoming degraded, incentivising them to slow down the degradation process and take earlier steps to start restoring the plot. To ensure that the baseline of zero is only used in appropriate cases, if more modest thresholds are set, it is recommended to require farmers to also set a dynamic yield baseline to ensure that only additional biomass would have the possibility to make a low ILUC-risk claim and not any already existing yield. Severely degraded land would still be exempt from the additionality test.

3.5 Robustness of compliance and auditing

3.5.1 Can audits of low ILUC-risk measures be performed according to standards of reliability, transparency, and independent auditing?

The low ILUC-risk certification guidance is designed to be used as an add-on to existing EC-recognised voluntary schemes. Voluntary schemes implementing the low ILUC-risk module therefore need to be recognised by the Commission to certify the core sustainability criteria in REDII Articles 29(2) to (5) and (10) for (at least) biofuels, and for bioliquids and biomass fuels if that is also relevant to their scope. They will also need to be explicitly recognised by the Commission to certify low ILUC-risk criteria as set in Delegated Regulation 2019/807.

EC-recognised voluntary schemes also need to be fully updated to include the detailed rules to verify sustainability and GHG emissions saving criteria and low ILUC-risk criteria as set

out in Implementing Regulation 2022/996[44]. This is all designed to ensure that schemes can ensure robust compliance, improved transparency and robust and independent auditing.

The Low ILUC-risk Certification Guidance developed as part of this project is designed to be in line with those requirements. Voluntary schemes recognised for low ILUC-risk are invited to adopt the guidance as a standard in their scheme.

3.5.1.1 Assurance level

Implementing Regulation 2022/996, Article 10(1) requires that "*The initial audit of a new scheme participant or a re-certification of existing scheme participant under a revised regulatory framework shall always be* ***on-site*** *and shall as a minimum provide* ***reasonable assurance on the effectiveness of its internal processes****. Depending on the risk profile of the economic operator, a* ***limited assurance level can be applied on the veracity of its statements***."

Coming to a "reasonable assurance" decision requires a higher level of checking from auditors than "limited assurance".[45] Ensuring a limited assurance level is a standard requirement for EC-recognised voluntary schemes and the recent Implementing Regulation 2022/996 introduces the higher reasonable assurance level, but only to initially check an operator's internal processes. The difference between the two levels is essentially the stringency of compliance checks and has an impact on e.g. number of samples analysed, number of days spent in audit, frequency of audits.

The voluntary scheme and certification body involved in the pilot project recommended that the rules for evaluating compliance with low ILUC-risk criteria be clearly established by voluntary schemes and integrated into their existing systems. An initial baseline audit for low ILUC-risk certification would need to very carefully check the management plan, the establishment of the dynamic yield baseline and the proof of additionality and the systems operators have in place e.g. to track yields and to ensure that additionality measures are implemented. These checks should be to a reasonable assurance level.

Subsequent additionality audits which check the calculations of additional biomass and low ILUC-risk claims could be done to a limited assurance level, whereby auditors can check a sample of calculations and claims made.

Should the EC require a reasonable level of assurance to for annual low ILUC-risk audits, (i.e. the higher level), it is reported that this would have significant impacts on the practices of certification bodies. In particular, the number of samples to be analysed when auditing economic operators would be affected. Auditors consulted in this study suggested that if a reasonable assurance level was required audits would take several weeks, which would also significantly impact costs.

[44] Implementing Regulation 2022/996 of 14 June 2022 on rules to verify sustainability and greenhouse gas emissions saving criteria and low indirect land-use change-risk criteria, available from: https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=CELEX%3A32022R0996 The findings from phase 1 of this project fed into Annex VIII on minimum requirements for certifying low ILUC-risk biomass.

[45] ISAE 3000 defines two levels of assurance: limited and reasonable. Limited assurance involves the auditor conducting activities such that their assurance opinion can be expressed in the negative form, for example: "…nothing has come to our attention to cause us to believe there are errors in the data." Whereas reasonable assurance requires a higher level of evidence gathering such that the assurance opinion can be expressed in a positive form, for example: "… based on our assessment, the data is free from material misstatement."

3.5.1.2 Auditor competencies and training/monitoring needs

The standard procedures against which the Commission assesses recognised voluntary schemes[46] already requires (amongst others) that auditors are independent from the economic operators being audited and free from conflict of interest. Auditors also need to be competent and trained. The audit team shall have the appropriate specific skills necessary for conducting the audit related to the scheme's criteria, and in accordance with the audit scope. In the case of low ILUC-risk certification, this would include auditors having specific training on the low ILUC-risk methodology and having specific skills and experience to audit the criteria, depending on the scope of the audit, e.g. severely degraded land, yield increase measures or mass balance in the case of transferring low ILUC-risk claims through the supply chain.

All local auditors who undertook the pilot audits were already ISCC-trained, and some were also qualified to conduct audits for other voluntary schemes, including the Roundtable on Sustainable Palm Oil (RSPO). Prior to the pilot audits, the local auditors took part in a half day training (online) from ISCC on the low ILUC-risk certification approach.

We recommend that a specific low ILUC-risk training shall be mandatory for all certification body's auditors before conducting low ILUC-risk certification audits. This ensures that only "qualified" auditors conduct the audits. Half to one day of additional training for the auditors should be considered in addition to the existing general training programme for the specific voluntary scheme.

The monitoring of auditors is expected to be part of the integrity program conducted by the voluntary scheme as well as controlled and monitored by national competent authorities. In addition, certification bodies have to ensure that their internal monitoring system that also complies with accreditation requirements (ISO 17065, 17021 or 14065). Certification bodies are obliged to assure that auditors are competent for the type of audit and company scope they are auditing. New auditors will be subject to a training plan. It is the responsibility of the certification body to decide if in addition to the specific low ILUC-risk training the auditor needs to join audits with an already qualified auditor and/or, as a final step, needs to perform a full audit under the supervision of an experienced auditor.

3.5.1.3 Transparency

Article 6 of Implementing Regulation 2022/996 sets out rules about the types of information voluntary schemes need to make publicly available, to ensure transparency. Furthermore, Annex VIII of the same Implementing Regulation sets out the minimum content of a low ILUC-risk certificate. This includes various details to describe the identity of the certified entity and the scope of certification, as well as the total volume of biomass certified as low ILUC-risk.

As with any new type of certification, low ILUC-risk certification can expect to be scrutinised by policy makers and stakeholders – especially in its early years – to ensure the system is robust. Transparency is crucial to establish and maintain credibility of the system. Ensuring transparency especially to the European Commission, Member States and other voluntary schemes will be especially important to learn and build a mutual understanding on which additionality measures, which barriers, and which projects can be certified as low ILUC-risk and the types of certified volumes that can be expected.

[46] See Assessment Protocol, available here: https://energy.ec.europa.eu/topics/renewable-energy/bioenergy/voluntary-schemes_en

3.5.2 Is there a risk of windfall gains?

The feedstock expansion report describes that "To fulfil the objective of low ILUC-risk concept, strict criteria are needed that effectively encourage best practice and avoid windfall gains." Windfall gains are understood to mean, for example, if too high a volume of additional biomass can be claimed or if a project is certified that is not really additional.

If the effect of implemented low ILUC-risk measures cannot be distinguished from other improvements in yield, there is a risk of windfall gains as any biomass produced above the dynamic yield baseline could be claimed as low ILUC. There is also a risk of windfall gains if projects are certified as low ILUC-risk when they are not additional (i.e. if the application of the financial attractiveness test or barrier analysis does not correctly identify additionality).

The following paragraphs describe the main risks of windfall gains, as perceived by the project team. Note that these are also described in the overview of remaining challenged that auditors should be vigilant of in section 0.

In some of the pilot projects (notably Brazil) the operators took a combination of measures to increase yield. Some of those measures might be eligible for low ILUC-risk certification and others not. However, if a farmer takes a combination of measures (and in some cases a different combination each year) this is hard to certify as all additional biomass above the baseline can be claimed as low ILUC-risk and it is not possible to disentangle the individual impact of the different measures. **It should be possible for farmers to be certified if they take a combination of yield increase measures, but attention must be paid in the initial baseline audit to ensure that farmers are really making a step change to take new measures (compared to what they have done in the past) to increase their yield.**

Several of the pilot projects reported that **non-ILUC related practices or natural events (e.g. weather or climate impacts) had a significant impact on the yield baseline and yield increase.** The yield increase and resulting additional biomass caused by the external factors cannot be easily disentangled from the additional biomass generated by the low ILUC measures, thus leading to a risk of windfall gains. However, it should be noted that external factors can have either positive or negative impacts on yield (baseline and additional biomass), thus there is the potential to either increase or decrease the biomass identified as additional in a given year. In an extreme case, **the natural variation in yields could result in a scenario in which an additionality measure that has zero or even negative impact on yield could still lead to additional biomass certification** if, for example, the baseline was set in bad years. There is a risk that a project takes an additionality measure that fails (i.e. that has either zero or negative impact on yield) but that due to variability it is still able to report the production of additional material in any year with better than average weather. As this reportable additional material would not be offset by yield shortfalls in other years (in years with observed yield below the baseline, the amount of additional biomass is simply zero) there is the risk of an 'additionality ratchet'[47] whereby it is predictable that even a project where the additionality measure is "unsuccessful" could claim low ILUC-risk additional biomass over the ten years of certification. **If a large number of operators are certified, the volume of additional biomass could be significant.**

For abandoned, severely degraded, or other unused land, all biomass cultivated on the land can be claimed as low ILUC-risk, and therefore would not be seen as windfall gains. However, if land is degraded and has an existing (likely low) yield that existing production could be certified as additional and low ILUC-risk. This may lead to windfall gains. It may be

[47] See also Sandford, C.; Malins, C. **2023**; Panoutsou, C. Challenges and Recommendations for Improved Identification of Low ILUC-Risk Agricultural Biomass. *Appl. Sci.*, *13*, 6349. https://doi.org/10.3390/app13106349

more appropriate for only the additional yield compared to an appropriate baseline on severely degraded land that currently produces a crop to be counted as additional biomass.

The financial attractiveness test, as currently formulated, is hard to pass as it has been reported by the pilots that the discount rate to be applied is low compared to their current capital costs. Thus, **the risk of windfall gains from a project passing the financial attractiveness test when it is not really additional is currently assessed as low**, although there may be some risk of project operators seeking to manipulate financial calculations in their favour, e.g. by maximising estimates of expected costs.

Guidance is provided to elaborate the non-financial barrier test in the low ILUC-risk certification guidance. However **the test remains, to a certain extent, subjective**. Voluntary schemes implementing low ILUC-risk certification must ensure transparency on the additionality tests and should work closely with certification bodies to share experiences of the barrier test especially and to update training materials for auditors as experience is gained, to ensure that the test is robust and implemented as meaningfully and consistently as possible.

3.5.3 What would be the opportunities for fraudulent claims?

In the context of this project, fraudulent claims are considered to be situations whereby operators would attempt to commercialise larger volumes of biomass than they are allowed to within their scope of certification. Fraudulent claims from non-certified operators were not considered, since these are not specific to the implementation of low ILUC practices and should already be addressed by voluntary schemes tracking fake certificates and related transactions.

Fraudulent claims opportunities are inherently bound to the capacity of auditors to accurately cross-check the data used by economic operators to calculate additional biomass or demonstrate that the cultivated land was abandoned or severely degraded. Such risks can generally be considered higher when robust yield data or satellite imaging are not available for auditors, although this is not specific to low ILUC certification. Since low ILUC-risk certification is more attractive for high ILUC-risk feedstocks, so too the risks of fraudulent claims are considered to be higher for high ILUC-risk feedstocks, which is currently only palm. Therefore, fraud mitigation efforts to ensure access to accurate and reliable data should primarily focus on palm production, especially average/historic yields.

For all the low ILUC-risk cases, there is a risk that, because **low ILUC material cannot be physically distinguished from non-low ILUC material**, **the system relies heavily on the voluntary scheme certification system being robust, and economic operators making accurate claims and passing those claims down the supply chain correctly**. It should be noted that for yield increase measures, a single farm will, by definition, produce *both* low ILUC and non-low ILUC material, because only the above-baseline biomass from a farm can be claimed as low ILUC. Therefore, the origin of the material or identity of the supplier will not distinguish whether the material is low ILUC or not. The low ILUC-risk claim needs to be very robustly passed down the supply chain as one of the sustainability characteristics and auditors need to be thorough in their checking of calculations and volumes of low ILUC-risk claims made down the supply chain.

Similarly, in the case of sequential cropping **it will often be difficult to physically distinguish between a crop grown as the main crop and the same type of crop grown as an intermediate crop**. Depending on the final definition of sequential or intermediate crop published by the Commission, it may be necessary to distinguish between intermediate

crops grown in different types of crop rotation[48], which is also not possible to distinguish physically. This results in a potential risk of fraud unless the origin of feedstocks and subsequent mass balances through the supply chain are carefully administered and checked. Similar to low ILUC-risk claims for other types of feedstocks, the system will rely heavily on a robust audit of the feedstock production and careful auditing of the traceability systems of operators through the supply chain. It should be noted however that in some sequential cropping cases, it **will** be easier to physically distinguish main crops from intermediate crops. For example, in the case of the Uruguay pilot, Brassica carinata is (currently) only grown as an intermediate crop. In the French pilot case, as the farm is using the intermediate crop for biogas, the intermediate (cereal) crop is harvested at an immature stage when it would not be able to be sold for food or liquid biofuel, and the crop is harvested whole to send to silage for biogas. In that case the intermediate crop is physically different from a cereal crop grown for food and would also go directly to the biogas plant, rather than being traded on the market, so there is a much lower opportunity for fraudulent claims.

A couple of (palm) stakeholders raised the concern that because only the additional biomass from a farm can be claimed, low ILUC supply chains will be quite fragmented and there will be a need to (at least administratively) aggregate volumes within the supply chain, which might lead to quite complicated logistics. **Note that complexity is not the same as fraud, but complexity makes the claims harder to understand, increases the risk of (honest) mistakes and makes supply chains harder to audit, all of which generally decrease trust and might also make fraud harder to detect.**

For yield increase additionality measures, if there is a high value for low ILUC-risk certified materials, there is an incentive and therefore a potential risk for economic operators to **intentionally underestimate or underreport their historic yields** so that the baseline is set lower and larger volumes of additional biomass can be claimed. This is a risk that should be minimised by robust auditing, but auditors should be aware of the risk of e.g. farmers selling feedstock via their neighbours to underreport their historical yield. These kinds of practices can also be avoided by increasing digitalisation of farm harvesting records.

For abandoned, severely degraded, and other unused land, fraudulent claims would require submitting a fraudulent satellite imaging analysis, forging government documentation demonstrating land status, or falsifying the characterisation of land degradation. Since satellite imaging analysis requires specific skills and experience and will most likely be performed by third parties, and similarly laboratory analyses for soil sampling for severely degraded land will be conducted by qualified and independent laboratories, this risk is considered to be low. One risk mentioned for severely salinated land (within the definition of severely degraded) was the risk of adding salt to contaminate a soil sample, which the voluntary scheme considered would not be difficult. For this reason, it is recommended that to the extent possible, auditors are present when soil samples are taken.

3.6 Administrative burden

Auditing low ILUC-risk criteria is done on top of auditing the existing sustainability requirements from voluntary schemes and therefore will require additional time from auditors, which is paid for by the operators being audited. The additional audit time, and therefore additional cost, includes the operator's time to prepare the management plan and associated evidence (e.g. of historical yields or satellite imaging in the case of abandoned

[48] The draft proposal to extend Annex IX includes the following definition of intermediate crop: ""Intermediate crops, such as catch crops and cover crops that are grown in areas where due to a short vegetation period the production of food and feed crops is limited to one harvest and provided their use does not trigger demand for additional land and provided the soil organic matter content is maintained."

land or soil sampling and laboratory analysis in the case of severely degraded land) and the auditor's time to check those documents and evidence. Pilot auditors estimated that an extra day of work would be required for a single farm and half a day for any extra farms for multi-site certification or additional requirements for low ILUC-risk certification. On top of that, additional training will be required for the auditors on how to audit the low ILUC-risk module.

In addition, voluntary schemes may apply licensing costs based on actual volumes of certified biomass/biofuel. Therefore, additional licensing costs may be applied to additional low ILUC-risk biomass. As an example, currently the annual fee with ISCC is between 50-500 Euros, based on the total turnover of material in metric tons by the unit (sustainable material; < 2.000 mt per year – 50 Euros). However, according to assurance providers, these costs might be primarily borne by the First Gathering Points (FGPs), when the FGP is the certification unit (as opposed to the farm) and may not necessarily represent direct external costs for the farmer.

The administrative burden was reported differently by pilots implementing yield increase measures and testing abandoned or severely degraded land.

Yield increase: For the pilot projects implementing yield increase additionality measures, some commented that the administrative burden was high in relation to the relatively low amounts of additional biomass expected and variability of low ILUC-risk biomass volumes expected year-on-year. This should be seen in the context that several of the pilot companies already had relatively high yields, so their potential to further increase yields was low. On the other hand, the pilot companies were all already certified, so it should be considered that the administrative burden for a company that is not yet certified would be considerably higher to get low ILUC-risk certified.

In general, stakeholders found the methodology to be complex, with some opportunity cost for economic operators, due to time spent understanding and implementing the required calculations. Some stakeholders during the public consultation on the draft guidance suggested that methodological questions remain which would benefit from further refinement, guidance or tools.

Crops which are not considered as high ILUC have limited direct policy incentive to seek low ILUC certification. For palm, currently the only high ILUC feedstock, it is expected that the number of palm producers willing to seek REDII and low ILUC certification will be limited due to uncertainty over exact amounts of low ILUC biomass that can be produced and existing bans on all palm use for biofuels in several EU Member States, making the EU biofuels market in general less attractive for palm producers.

Abandoned and severely degraded land: The administrative burden for compliance with low ILUC-risk certification requirements for abandoned land in the Ukraine pilot was deemed reasonable, but satellite imaging may need to be performed by a third party.

The burden of compliance for the Spain pilot on severely degraded land was likely higher than would be expected for certification because the pilot carried out a more thorough sampling and testing exercise. To reduce the administrative burden for the farmer, the final Soil Sampling Protocol should require a lower sampling intensity than was conducted in the pilot and the samples can be taken in a standard W-formation (as is common for soil sampling) instead of a full grid-formation. To the extent possible, the low ILUC-risk certification should follow other standards or existing practices to avoid requiring farmers to follow multiple protocols. The laboratory analysis cost 1,400€ for 67 samples. A full soil analysis (NPK, SOM, pH, electro conductivity) was conducted on 32 of the samples, as a compensation for the farmer to take part in the pilot and postpone sowing the next crop by a couple of days. The other half of the samples were just tested for SOM. For the purpose of

this pilot we took more samples than would be necessary to determine severely degraded land for low-ILUC certification. As this plot is <5ha and has homogeneous conditions throughout the plot, only 1 sample would need to be analysed in the lab for low ILUC-risk certification. This would cost around €30-32 to measure SOM and salinisation.

3.7 Group certification

Group certification is a commonly used scope by Commission-recognised voluntary schemes, typically to certify groups of small or medium sized farms. Low ILUC-risk certification builds on the existing group certification approach of voluntary schemes to minimise the administrative burden. This means that group auditing for low ILUC-risk certification is permitted for a group of farms on which the same target crop (or same combination of crops in the case of sequential cropping) is cultivated in the same geographical region using similar agricultural management practices. Group certification for farms and plantations is only permitted when the areas concerned are near each other and have similar characteristics (as is the case for existing voluntary scheme certification). Farms and plantations can become certified under the framework of a first gathering point or central office. The exact conditions that shall be met are described in the certification guidance.

To reduce administrative burden, the low ILUC-risk group certification should build on the existing group certification infrastructure to the extent possible. Low ILUC-risk certification can therefore be a sub-group within an existing group or on an individual basis within the existing group certificate. Dynamic yield baselines need to be established at the individual farm (plot) level and additionality measures leading to low ILUC-risk biomass need to be taken at the individual farm level. All eligible farms who wish to be low ILUC-risk certified need to pass the additionality test individually, but where they are growing the same crop in the same area and are taking the same measure, they may be able to collectively show that they face the same barriers. Both the dynamic yield baseline and the additionality test can be calculated by and coordinated by the central office / group leader / first gathering point. This means that the group leader coordinates the activities, collects data for all management plans and annually calculates the additional (low ILUC-risk) biomass that can be claimed, and is responsible for arranging auditing. The group leader would also have responsibility for internal checking. Independent external auditing within the group then takes place annually on a sample basis.

3.8 Sustainability

The definition of **additionality measure** is "…any improvement of agricultural practices leading, **in a sustainable manner**, to an increase in yield…" (Delegated Regulation 2019/807 Article 2(5)). Sustainable manner in this context is not further defined.

Certification to a Commission-recognised voluntary scheme – which often cover broader environmental and social sustainability criteria in addition to the REDII core criteria – is one of the main ways in which sustainability of the additionality measure is ensured. Pilot auditors reported that they were generally not comfortable identifying sustainability risks that are not part of an existing REDII or voluntary scheme framework, which means that the level of sustainability checking will differ depending on the scheme that the low ILUC-risk module is being used alongside.

The low ILUC-risk certification approach should not encourage or reward an increased use of intensive agricultural practices at the expense of soil health. Implementing Regulation 2022/996 states "The additionality measure shall not compromise future growing potential by creating a trade-off between short-term output gains and mid/long-term deterioration of soil, water and air quality and pollinator populations." Whilst the low ILUC-risk module can be

used alongside any existing EC-recognised voluntary scheme, **for schemes that do not already cover these broader environmental criteria (soil, water, air and pollinators), auditors should be especially vigilant to ensure that the additionality measures taken do not negatively impact the long-term sustainability of the land for agriculture. We recommend that the Commission requires schemes that wish to be recognised to certify low ILUC-risk also add these criteria.**

Six of the eight yield increase pilots were already certified to an EC-recognised voluntary scheme (both ISCC and RSPO for the palm pilots, RSB for the Uruguay pilot and 2BSvs for the Brazilian soy pilot), and continued to be so after implementation of the additionality measure. This is taken as the basis for the projects demonstrating that they meet the EU mandatory sustainability requirements, and other requirements of the voluntary schemes. The France pilots were not certified to a voluntary scheme, but the ISCC criteria were checked as part of the pilot audit checklist and no concerns were found.

An important sustainability risk especially when it concerns yield increase is to ensure that the farming is not over-intensified, to the extent that it has a negative impact on long term sustainability. An example would be increasing yields by simply increasing the volume of chemical fertilisers used. Whilst farmers will be aware of this risk, and voluntary schemes would safeguard against this risk to a certain extent in the GHG calculation, it is something that low ILUC-risk auditors should be vigilant of as it would be a clear way to increase (short-term) yields.

It is possible for yield increase pilots to have a positive impact on sustainability. The Colombian phase 1 pilot implemented micro irrigation, after which the operator reported a reduction in water consumption of 70%, which is being monitored by the local water board. For the Malaysia phase 2 palm pilot, the main yield increase measure reported was the implementation of a “bio farming programme” which promoted organic farming techniques to small holder farmers, which amongst others brought biodiversity benefits compared to other palm plantations.

One criticism raised of the yield increase low ILUC-risk approach in general is that it promotes an increase in mono-cropping, which – whilst an increase in productivity makes more efficient use of the land – it is also in contrast to the trend towards more regenerative farming and multi-cropping practices which can promote improvements in soil carbon and biodiversity. A future iteration of the low ILUC-risk policy should consider how these sustainable approaches can be promoted.

For Ukraine, the land is not yet under cultivation (it is abandoned) and therefore is not certified. The main sustainability concern is related to GHG emissions from direct land use change. Although the land conversion in this case (non-highly biodiverse grassland to agricultural land) could be certified by an EC-recognised voluntary scheme, any biofuel made from the resulting feedstock would have difficulty meeting the required GHG saving threshold in the REDII when dLUC emissions are taken into account. Furthermore, long periods of abandonment may lead to increases in carbon stock and biodiversity, which could face issues to meet the core REDII sustainability criteria if that land were converted. High biodiversity was not considered a concern in the case of the Ukraine pilot, but could be in other cases. A tipping point exists where the conversion of abandoned land back to agriculture or forestry may contravene land-use change restrictions described in Article 29 of the REDII. These aspects would be covered by the existing REDII sustainability criteria and voluntary schemes, so the methodology has safeguards for these, but it may limit the extent to which this category of low ILUC-risk certification can be used.

Similarly, the land in the Spain pilot was not currently certified to a voluntary scheme but the auditor checked for compliance with the core REDII criteria and found no concerns. The pilot pointed to the broader sustainability benefits of growing camelina, such as good water efficiency, avoiding nitrogen leaching by acting as a catch crop and its allelopathic effect which allows for good weed competition. Regarding severely degraded land more broadly, a large share of existing agricultural lands are physically, chemically and/or biologically degraded. Such degradation may trigger the use of more intensive agricultural practices (e.g. increased use of synthetic inputs to compensate for reduced availability of nutrients), thus further aggravating land degradation over time. **The low ILUC certification approach should not encourage or reward an increased use of intensive agricultural practices at the expense of soil health.** The cultivation and restoration of severely degraded land eligible for low ILUC-risk certification is therefore an area where auditors should be vigilant to ensure that practices avoid significant GHG emissions in the short term and have the long-term soil health in mind (see also Section 5.3).

The sequential cropping pilots (Uruguay, France and potentially Spain) were reported as being generally beneficial to the environment, especially regarding the retention of nutrients and carbon in the soil, and the reduction in the use of chemical inputs. This was particularly the case in the French pilots, in which, in addition to the benefits to the soil from the use of catch and cover crops, additional biomass is used in a digester to generate biogas. The resulting digestate is then used as fertilizer, which further enhances soil enrichment and nutrient recycling, while reducing costs related to the use of chemical inputs. UPM Biofuels also found that the sequential process in the phase 1 Uruguay pilot creates a positive soil carbon balance following increased crop biomass, thanks to a reduction of soil erosion, higher nutrient retention and conservation, and increase in total annual yields.

The multiple environmental benefits stemming from the implementation of low ILUC-risk go beyond the core REDII sustainability criteria described in Article 29 of the REDII. This could be beneficial for economic operators seeking compliance and certification by EC-recognised schemes with a broader scope of environmental and social requirements than what the REDII requires (e.g. ISCC, RSB, Bonsucro, etc.), whereas for economic operators engaged with voluntary schemes limited to the exact REDII scope (e.g. REDCert, 2BSvs, etc.), such benefits would not exist.

3.9 Definition of small holders

As part of the Commission's review of the legislation, Article 7 of the Delegated Regulation requires the Commission to review "the factors justifying the small holders' provision". The phase 1 pilots did not work with small holders, however the Malaysian palm oil pilot from phase 2 included small holders and group certification in the scope.

Article 5(1)(a)(iii) of the Delegated Regulation 2019/807 exempts small holders from needing to prove compliance with the additionality criteria (the financial attractiveness test or non-financial barrier analysis). Small holders are defined as follows:

Definition

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;

Small holders are exempt from the additionality test to avoid "an unreasonable administrative burden in light of the significant potential for productivity improvements and the barriers faced to finance the necessary investments" (Delegated Regulation 2018/807 Recital 15). The view that such small holders already face financial barriers and often already have difficulty accessing certification due to the administrative burden was shared by all stakeholders who we spoke to during this project.

It should be noted that small holders still need to comply with the other requirements of low ILUC-rick certification, including taking an additionality measure, calculating a dynamic yield baseline against which additional biomass is compared and complying with the core REDII sustainability criteria. The Delegated Regulation considers small holders to be independent holdings less than 2 hectares, explaining that "an estimated 84% of the world's farms are managed by smallholders cultivating less than 2 ha of land", referencing a report by Lowder et al. (2016).[49]

The Malaysia pilot reflected on the definition and role of small holders in the global context, and identified the risk of artificial fragmentation of farms. These concepts are addressed below.

3.9.1 Small holder definitions

There is no universally accepted definition of small holder. The concept of small is relative to agroecological and socio-economic considerations. However, stakeholders we have engaged with throughout this project – including the pilot companies – have consistently questioned the definition used in this context and said that 2 hectares is very small. In the next sections we describe the data and definitions of small holder and family farms described in Lowder et al., and the definitions of small holder used by Commission-recognised voluntary schemes.

The data from Lowder et al show that 84% of farms by number can be considered small farms (<2 ha). However, when looking at the area of agricultural land those farms cover, we see a large discrepancy: small farms <2ha cover about 12% of the world's agricultural land. Samberg et al. (2016)[50] found in their study that 28% of agricultural land is held by small holders (<5 ha), of which most were small holders with less than 2 ha (82%).This may explain the stakeholder perception that there are very few small holders less than 2 ha because, whilst the number of such small holders is high, the land area covered is low and as such they are perceived to be uncommon. Stakeholders from different continents have consistently said that the definition of small holders below 2 ha is very small and their perception is that **there are a lot of small farms larger than 2 ha that would struggle with the low ILUC-risk methodology**.

Voluntary schemes have their own definitions of small holders. ISCC is one the largest voluntary schemes worldwide for the certification of biofuels. ISCC uses the term

[49] Lowder, S.K., Skoet, J., Raney, T., 2016. The number, size, and distribution of farms, small holder farms, and family farms worldwide. World Dev. 87, 16–29

[50] Samberg, L.H., Gerber, J. S., Ramankutty, N., Herrero, M., West, P.C., 2016. Subnational distribution of average farm size and smallholder contributions to global food production. Environmental Research, Vol. 11, Nr. 12.

"independent small holder" (ISH) to describe farm where: a) The labour on the farm is principally provided by the family; b) the farm provides the major source of income for that family; c) on that land, smallholders are free to choose how to use land, which crops to plant and how to manage it; d) the land is not contractually bound to any oil mill and may receive support or extension services from government agencies or other support system; e) the planted oil palm area on the own land of an ISH is **less than 50 ha**. The current average size of an ISCC-certified independent small holder is 2-3 ha[51]. These broader elements of the definition, beyond just size, are useful for characterising small holders who would be expected to experience inherent barriers to increasing yield.

In the context of oil palm, RSPO defines smallholders as **less than 50 ha** (with national interpretations sometimes using a smaller threshold in line with national rules). Furthermore, RSPO defines small holders as farmers who grow oil palm alongside subsistence crops; and RSPO recognises three types of small holders: independent small holders if they are not bound to a mill; scheme small holders and associated small holders if they are bound to a mill.[52] In Indonesia, small holders are defined as being less than 25 ha[53] and Malaysia small holders are defined as those less than <40.46 ha (100 acres). [54]

The average farm size of the 111 farms included in the Malaysia phase 2 pilot was 4 ha, 21 of the farms were below 2 ha. The largest farm was 8.4 ha, the smallest 0.8 ha.

3.9.2 Role of small holders in the global oil palm production

When we look at the contribution of small holders to the global oil palm production, we see that small holders with < 2 ha in sub-Saharan Africa, Asia and Latin America make up for 20% of global oil palm production. Just over 53% of the global oil palm production comes from farms sized 2-5 ha. The examined regions make up 98% of the global oil palm production and can be considered representative[55]. This means that farms <5 ha make up nearly 75% of global oil palm production. The top producing countries – Indonesia and Malaysia – have different official thresholds to be considered a small holder farm. In Indonesia, 41% of the oil palm plantations were held by designated small holders (<25 ha)[56], with an average small holder size of 2 ha[57]. In Malaysia designated small holders (<40.46 ha) produced 40% of the palm oil, with the average smallholder size being 3.9 ha[58].

[51] ISCC 2018. Certification concept for Independent Smallholders (ISH) under ISCC. https://www.iscc-system.org/wp-content/uploads/2017/10/ISCC-ISH-Certification-concept_PPT.pdf

[52] RSPO Smallholders. https://rspo.org/smallholders

[53] Badan Pusat Statistik, 2021. Statistik Kelapa Sawit Indonesia 2021, ISSN/ISBN: 1978-9947

[54] Rahman, S., 2020. Malaysian Independent Oil Palm Smallholders and their Struggle to Survive 2020. ISEAS Yusof Isham Institute. No. 144

[55] Samberg, L.H., Gerber, J. S., Ramankutty, N., Herrero, M., West, P.C., 2016. Subnational distribution of average farm size and smallholder contributions to global food production. Environm. Research, Vol. 11, Nr. 12.

[56] Badan Pusat Statistik, 2021. Statistik Kelapa Sawit Indonesia 2021, ISSN/ISBN: 1978-9947

[57] Glenday, S., Paoli, G., 2015. Overview of Indonesian Oil Palm Smallholder Farmers. Daemeter Consulting.

[58] Senawi, R. Khabibor Rahman, N., Mansor, N., Kuntom, A., 2019. Transformation of oil palm independent smallholders through Malaysian sustainable palm oil. Journal of Oil Palm Research. Vol 31. (3)

3.10 Overview of challenges

The following table provides an overview of the key challenges described in this chapter that the pilot projects have highlighted and aspects that auditors should focus on to address those challenges. To the extent possible, the Low ILUC-risk Certification Guidance flags these challenges and describes approaches that aim to mitigate the risks as much as possible, nevertheless some inherent challenges remain. As such auditors should be aware of these challenges and mindful of them when certifying low ILUC-risk projects.

Some challenges that could be addressed through adjustments to the low ILUC-risk policy design are described in chapter 5.

Table 4 Key challenges certifying low ILUC-risk projects

Challenge	Background	Impact/Risk	Recommendation for auditor
Additionality – financial attractiveness test			
It can be difficult to estimate the cost of measures not yet taken	For some additionality measures that are planned, an economic operator will have an estimate of the cost, for example based on a quote for new capital equipment. However, for other measures the cost can be difficult to predict. For example, in the Malaysia phase 1 pilot, the actual cost of thinning of palm trees varied by more than 10-fold for the different subplots of the plantation on a per ha basis, so estimating a per ha cost for the additionality test would be potentially difficult.	If the estimated cost is hard to estimate and prove, it will make conducting the financial attractiveness test difficult. The estimated cost can be significantly different to the actual cost, opening a loophole in which operators could overestimate their costs to pass the additionality test.	**Auditor should ensure budget estimates come from reliable suppliers and are in-line with industry practice. Over time, the insights from assessments can be collected by the voluntary schemes to further develop the guidance to ensure a strong and harmonized approach and a minimum level of proof of additionality.**
Biofuel feedstock price variability impacts the financial attractiveness calculations	Feedstock prices vary on a daily basis and across years as they are influenced by many different factors outside the control of feedstock producers.	Economic operators could underestimate future revenues to pass the additionality test. Passing the financial additionality test will be more difficult after a period of high feedstock prices and easier after a period of low feedstock prices.	**The certification guidance suggests using an average price over the period of historic yield data for consistency.**
Predicting future additional biomass volumes is highly uncertain	Making a reliable estimate of future additional biomass volumes, as impacted by non-linear growth curves, non-ILUC-related practices and weather events is extremely challenging. Predicting future additional biomass has two roles: 1) to enable the auditor to check if the actual volume of additional biomass claimed is reasonable and in line with expectations	For 1), the certification guidance requires auditors to check additional biomass claimed against expected volumes and request justification from the economic operator if the figures are not in line. Economic operators can only claim the actual observed additional biomass as Low ILUC-risk.	**Whilst this check can be done by an auditor, to avoid unnecessary administrative burden and uncertainty for operators, it should be avoided that this leads to a situation where the validity of the financial attractiveness test has to be checked each year. The additionality test should be a one-time test to become certified and should be**

Challenge	Background	Impact/Risk	Recommendation for auditor
	to help them to flag and check volumes that could be too large and could indicate fraudulent activity, and 2) to feed into the revenue estimate in the financial attractiveness test.	For 2) whilst the auditor can check the figure used in the financial attractiveness test *ex-post.* If the figure is not in line, to the extent that the auditor judges the project should not have passed the additionality test, low ILUC certification may need to be withdrawn.	**valid for 10 years. This requires that significant scrutiny is given by auditors and voluntary schemes to the appropriateness of the estimates used in the financial attractiveness test up-front.** **Furthermore, if a certification audit is conducted before an additionality measure is taken, in the following audit, auditors will need to compare costs incurred to costs predicted (and used as the basis for the financial attractiveness test) to ensure firstly that the additionality measures that involved a cost were actually taken and secondly that the predicted costs were a reasonable estimate such that the project should indeed have passed the additionality test. If the actual additionality measure in practice deviates significantly from the project plan and the auditor considers that the measure would not pass the additionality test in practice, then the auditor can withdraw the low ILUC-risk certificate.**
Discount rate used by economic operators varies, and in most cases is higher than the given values	Both the phase 1 Malaysia and Colombia pilots revealed typical discount rates, which were substantially higher than the rate suggested in the guidance. The rates are low compared to rates that a business might use and especially low in today's context with high inflation rates.	In some cases, higher discount rates would make real project NPV negative, whilst the calculation would be positive when using the stipulated ones.	**The discount rates stated in the Implementing Regulation 2022/996 should be used in the NPV calculation to avoid inconsistencies.**

Challenge	Background	Impact/Risk	Recommendation for auditor
Additionality – barrier analysis			
It is hard to credibly prove that a yield increase measure was made possible by access to EU biofuels market, especially when it concerns a commodity crop	It is conceptually hard for a farmer producing a commodity crop that could go to a number of different markets in different countries to prove on a farm level that an additionality measure was made possible by access to the EU biofuel market specifically.	For farmers without an established contract with an EU biofuel company, it would be difficult to prove a direct link between the EU biofuel market and the decision to take an additionality measure, and therefore difficult to pass the non-financial barrier test.	**Some examples are provided in the certification guidance for valid barriers and how a link to the EU biofuels market can be demonstrated.**
It is difficult to distinguish which barriers are financial and which ones are not	Implementing Regulation 2022/996 says "Any barrier whose cost can be estimated shall be included in the financial attractiveness analysis…" However most, if not all, barriers could ultimately be translated to financial barriers. A more nuanced approached would be beneficial to clarify the differences between the two options for the additionality test.	As worded, the barrier analysis and the financial attractiveness test are not equally viable options for the additionality test.	**A more nuanced approach could be allowed, especially for smaller farms who do not always make decisions based purely on financial considerations. For those farms, the financial attractiveness test should be used when 'cost can *reasonably* be estimated'. If this is not possible, the barrier analysis can be used.**
The barrier analysis remains, to a certain extent, subjective. Careful attention will be needed to guarantee robust and consistent implementation	Because of a lack of documented evidence for barriers preventing the uptake of additionality measures, auditors need to rely on qualitative descriptions instead of quantitative data to confirm whether the identified barriers can be considered valid, and whether the barriers apply in that specific case, to the specific farm, which did not allow for objective conclusions.	Verifying the implementation of the barrier analysis on qualitative descriptions only could lead to inconsistency and reduce the robustness of the verification. There is a risk of a 'race to the bottom' if economic operators seek different auditors until one judges that they pass the barrier test. It is likely to become a target for criticism and possibly even a target for fraud.	**Examples are provided in the certification guidance for valid barriers. It will be important for Certification Bodies and voluntary schemes to share experiences with the barrier analysis to learn from implementation of the approach in practice, with a view to improving the objectivity and robustness of the guidance over time**

Challenge	Background	Impact/Risk	Recommendation for auditor
For small holders there is a risk of artificial fragmentation of farms	Small holders are exempt from the additionality test. This brings the risk of artificial fragmentation of farms to meet the small holder definition and thus avoid the additionality test.	Farms could be wrongful low ILUC certified if they would not pass the additionality test.	**Auditors should be aware of this risk and seek justification during the baseline audit if there has been a recent change in the land area to bring the farm below the small holder threshold.**
Dynamic yield baseline			
Natural variations in yield are high, caused by external factors, including weather	High natural variation in yields was observed in the pilots. The exact effect of external factors such as weather is difficult to disentangle from the impact of yield increase measures. This affects the dynamic yield baseline as any variations in the three years prior to the application are included in the baseline.	There could be an incentivise for operators to deliberately apply for low ILUC certification after bad weather events to set a low baseline. In an extreme case, the natural variation in yields could result in a scenario in which an additionality measure that has zero or even negative impact on yield could still lead to additional biomass certification if, for example, the baseline was set in bad years.	**Natural variation in yields and therefore changes in the annual volume of low ILUC biomass that can be claimed should be expected.** **Nevertheless, yield is the key indicator for low ILUC biomass and auditors need to check and verify yield data carefully and ensure outliers are discarded from the baseline calculation.** **It should be avoided that baselines are set after a known period of low yields due to bad weather.** **After certification, auditors also need to check that the additionality measure has been taken as described.**
Combinations of additionality measures taken in the past can make it	Farmers have often tried out different combinations of potential yield increase measures in the past.	This can make it hard to identify one clear start year when it could be considered that low ILUC additionality measure(s) are introduced and the baseline should start.	**Certifying marginal changes in yield as low ILUC will be difficult. Auditors should pay attention in the initial baseline audit to ensure that farmers are really making a step change to**

Challenge	Background	Impact/Risk	Recommendation for auditor
hard to set a clear baseline			**take new measures to increase their yield.**
Chosen calculation approach brings different results	The different calculation approaches resulted in varying baselines and yield increases.	This could incentivise operators to choose the most favourable approach, i.e., the method providing the lowest possible baseline and the highest possible additional biomass.	**The guidance reflects on this by suggesting the preferred approach, and asking the auditor to request additional supporting data if the operator wants to use a different approach.**
Errors were often made implementing the global trendline or "slope" element of the baseline	The dynamic yield baseline is calculated as an average of the last 3 years of yield data, combined with a slope based on the global yield trend of that crop.	If operators and auditors omit this step or make errors, this would lead to inconsistent baseline setting, with some operators having their baseline	**The certification guidance provides worked examples with step by step instructions to set the dynamic yield baseline. Auditors need to pay careful attention in the baseline audit to make sure all steps have been correctly followed.**
Variability between sub-plots	Yield data between plantation or farm sub-plots can vary significantly. Therefore, averaging yields over the entire plantation may not be representative for every sub-plot and could result in an inaccurate baseline.	The sub-plot chosen could artificially increase or decrease the amount of additional biomass claimed.	**The auditor should ensure that sub-plots are either considered as different plots and hence each should have their own baseline, or if only one baseline is used, that the additionality measure is taken across the whole area and the sub-plots characteristics, including yields, are similar.**
Yield curve needs to be defined for perennial crops other than palm	A normalised standard growth curve is needed to set a dynamic yield baseline for yield increase projects involving perennial crops. Currently the guidance only includes a standard growth curve for palm, as this is the only high ILUC-risk feedstock at present.	Palm is the only perennial crop that can be certified using the current guidance.	**If there is demand to certify yield increase projects for other perennial crops, we recommend that the European Commission either provides the standard growth curves for these crops or delegates the provision of the standard growth curves to the**

Challenge	Background	Impact/Risk	Recommendation for auditor
			voluntary schemes as part of the low ILUC-risk certification process.
Methodology for semi-perennial crops	The methodology in setting the dynamic yield baseline is not fully defined for semi-perennial crops.	Semi-perennial crops do not fit the perennial crop methodology	**The guidance currently suggests that sugar cane shall be treated as an annual crop by taking an average of the 3 latest years of data.**
Yield increase measures for palm might take longer than one year to have an impact	Due to the perennial nature of palm, it can take around two years after the implementation of the additionality measure to see the yield increase effect.	This would reduce the additional biomass that could be claimed over the ten year period, as the initial years would be lost.	**The guidance introduces the possibility to delay the start of the 10-year claiming period to account for this discrepancy.**
For sequential cropping, different units of the additional biomass can offer different results	The unit used for the calculation of historical yields and dynamic yield baseline is in tonnes/ha, which is appropriate for the aggregation and comparison of biomass outputs of the same crop type. However, for sequential cropping, a different unit may be more appropriate, given different expected yields and component values of the different crops in a rotation.	The units chosen can artificially increase or decrease the amount of additional biomass claimed.	**The guidance specifies that impacts on the main crop yield should be on an energy basis.**
Unused, abandoned, severely degraded land			
Direct land use change emissions associated with converting abandoned land into agricultural land	Any conversion of land must meet the core REDII sustainability criteria, including conversion of abandoned land to agricultural land. Some land use changes are permitted under the REDII, but any **direct** land use change (dLUC) emissions have to be taken into account	Land that has been left abandoned for more than 5 years will have some re-growth and in the phase 1 pilot's case can even develop into a grassland over time. If dLUC emissions from conversion of a grassland (or continuously forested area <10% canopy cover) into	**Auditor needs to ensure dLUC emissions are appropriately calculated and passed through the supply chain.**

Challenge	Background	Impact/Risk	Recommendation for auditor
	in the associated GHG emissions calculation for the biofuel.	agricultural land are included, the GHG savings requirement is unlikely to be met for any biofuel produced from the land.	
Potential biodiversity concerns associated with converting land	There could also be biodiversity concerns that would prevent land conversion meeting the core REDII sustainability criteria if the land has been abandoned for a long period and biodiversity or the vegetation have increased, especially if the ecological climax (ultimate vegetation stage) in a given region is forest.	Conversion of abandoned land to agriculture as part of low ILUC certification should not negatively impact biodiversity.	**Specifically, auditors need to ensure the core REDII sustainability criteria from Article 29 are complied with, with particular attention to ensure abandoned land has not become highly biodiverse grassland during the period of abandonment.**
No threshold to define when an area is used for "substantial amount of fodder for grazing animals"	The definition of unused land (of which abandoned land is a sub-set) says land needs to demonstrate it is not used for "…energy crops nor any substantial amount of fodder for grazing animals." The grazing part is currently left to the discretion of the auditor. Setting a fixed threshold for "substantial" is not recommended as it will vary per region and per type of animal so will be too challenging in practice.	No clear threshold could lead to inconsistent auditing on this part.	**From the perspective of avoiding ILUC, it is important for the auditor to consider whether there is other land available in the proximity for animals to graze, if displaced.**
No standard methodology to measure erosion in the field	There is no standard approach used to measure erosion, therefore it is unclear how "severely eroded" can be proven (part of the definition of severely degraded land). Especially wind-related erosion happens over a long period of time and is not routinely measured by farmers.	This measure is needed to demonstrate severely degraded land status.	**The pilot project suggested that wind erosion is better suited to demonstration through the use of peer-reviewed erosion risk maps to indicate whether a farmer is located in a region with a high risk of erosion, such as erosion-risk maps provided by JRC or equivalent. (Note that high erosion risk would still have to be combined with a measured SOM**

Challenge	Background	Impact/Risk	Recommendation for auditor
			below the proposed threshold to count as severely degraded land.) **Photographic evidence of erosion can also be provided, if available.**
Auditing			
No physical distinction between low ILUC-risk feedstocks and high ILUC-risk feedstocks	Low ILUC certified feedstocks can be any type of feedstock, it is not possible to physically distinguish between low ILUC-risk and high ILUC-risk feedstocks (or "normal" feedstocks). Especially for yield increase projects, by definition low ILUC-risk feedstock will be produced in the same field as high ILUC-risk feedstock. Therefore the mechanism relies heavily on a robustly administered mass balance system to pass the appropriate claim down the supply chain.	If the mass balance system is not administered and audited properly, and the volume of low ILUC claims is not correct, this could risk the credibility of the mechanism.	**Auditors need to focus audit effort throughout the supply chain on checking the mass balance records to ensure claims are robust**
Inaccurate yield data or risk of farmers selling feedstock that was grown on a neighbouring farm as their own to enhance yields claimed	The low ILUC mechanism relies on accurate yield data – both historical yield data to set the baseline and observed yields to claim additional biomass. If farmers have incorrect or inaccurate yield data or if there are activities such as bringing a neighbour's crop to market and counting it as your own, this could distort the data and if done deliberately to set a low baseline or claim a high volume of additional biomass could represent fraudulent activity.	Selling feedstock that was grown on a neighbouring farm as your own to falsely claim high yields would constitute fraudulent activity and farmers would be able to claim more low ILUC-risk feedstock than was grown.	**Auditors need to focus audit effort on checking and verifying yield data**

Challenge	Background	Impact/Risk	Recommendation for auditor
Sustainability			
Ensure additionality measures benefit the long-term sustainability of the land	It is important to ensure that additionality measures are beneficial for the long-term sustainability of the land and, especially in the case of yield increase measures, to ensure that the farming is not over-intensified, to the extent that it has a negative impact on long term sustainability. An example would be increasing short term yields by simply increasing the volume of chemical fertilisers used. Whilst farmers will be aware of this risk, and voluntary schemes would safeguard against this risk to a certain extent in the GHG calculation, it is something that low ILUC-risk auditors should be vigilant of as it would be a clear way to increase (short-term) yields.	The mechanism should avoid incentivising short term yield increases that would harm in the productivity of the land in the longer term.	**Whilst the low ILUC-risk module can be used alongside any existing EC-recognised voluntary scheme, for schemes that do not cover broader environmental criteria (soil, water and air), auditors should be especially vigilant to ensure that the additionality measures taken do not negatively impact the long term sustainability of the land for agriculture.**
Avoid excessive chemical inputs to restore severely degraded land	Severely degraded land requires careful actions to restore the land and improve soil quality. This is often a process that takes several years. Especially soil that is low in carbon can have very high nitrous oxide emissions if chemical fertilisers are used. Auditors should therefore be vigilant to ensure that practices avoid significant GHG emissions in the short term and have the long-term soil health in mind.	The low ILUC certification approach should not encourage or reward an increased use of intensive agricultural practices at the expense of soil health or emissions.	**Auditors of severely degraded land projects should pay particular attention to the appropriate use of chemicals.**

4. Applicability of the low ILUC-risk methodology to different feedstocks, regions and scales

This chapter provides a reflection on how low ILUC-risk certification currently fits into the policy landscape for biofuels, bioliquids and biomass fuels, and its applicability in different contexts.

4.1 Reflection on how low ILUC-risk certification fits into the current policy landscape

As described in section 1.3, low ILUC-risk biofuels offer an opportunity for economic operators to avoid the phase out set on high ILUC-risk fuels. As currently defined, there are no other explicit policy drivers for *non*-high ILUC-risk feedstocks to become low ILUC-risk certified.

In that context, whilst there has been significant interest in low ILUC-risk certification during the project, the project team would not expect the volumes of low ILUC-risk fuels that reach the market to be large, as low ILUC-risk certified palm biofuel will be competing with biofuel from other food and feed crops within the food and feed cap. The cap is set at a maximum of 1% above the 2020 level of food and feed crop use for biofuel per member state, and there is therefore expected to be no growth in food and feed biofuels in Europe compared to today. Furthermore, several member states are already implementing a total ban on palm for biofuels. If other feedstocks are added to the list of high ILUC-risk feedstocks, the driver to get low ILUC-risk certified would increased, but nevertheless the high ILUC-risk phase out sends a strong signal to the biofuels market. Several pilot participants commented that the fact that the low ILUC-risk claim can only be applied to a fraction of the farm output (i.e. the above-baseline volume of biomass) and not to the full yield from the farm makes the mechanism rather unattractive for economic operators.

Therefore, the role of low ILUC-risk certification in the current policy landscape can be considered modest, in comparison with other policy signals in the upcoming RED III, including updates to Annex IX, double-counting regimes and an increasing shift towards GHG accounting for biofuels quotas.

However, whilst the criteria to define low ILUC-risk biofuels in Delegated Regulation 2019/807 are very specific, the term “low ILUC biofuels” is often used more broadly, for example to describe yield increases of other non-high ILUC-risk feedstocks or any feedstocks grown on marginal or degraded lands.

There is an opportunity for elements of the low ILUC-risk mechanism to be used to demonstrate additional biomass in other policy contexts, for example, to support the identification of intermediate crops or severely degraded land in the context of compliance with Annex IX (if those categories are added to the final version of the Annex). This could enhance the usefulness and attractiveness of the low ILUC approach, beyond just avoiding the high-ILUC risk crop phase out.

In scoping this project, the Commission asked the project team to examine whether the low ILUC-risk criteria can be implemented in practice in the following contexts:

- The criteria shall be applicable to **all relevant types of food and feed crops** that are commonly used for production of biofuels and bioliquids

- The criteria shall be applicable both **in the EU and in third countries**

- The criteria should be implementable both for **single holdings or groups of holdings**

The following sections describe whether the low ILUC-risk criteria can be used in those different contexts.

4.2 Applicability of low ILUC-risk certification to different feedstocks

The low ILUC-risk certification guidance has been designed so it could be used for any type of feedstock. All the pilot projects were able to follow the calculations to determine the dynamic yield baseline, calculate the volume of additional biomass (when the measure had already been taken) and to undertake the additionality test.

However, the incentive to engage in low ILUC-risk certification varies across feedstocks. Passing the additionality test requires proving that the project was conducted because of the value signal from EU biofuels, which can only make sense for high ILUC-risk feedstocks, because no specific incentive for non-high ILUC feedstocks to be certified is included in the REDII. Currently, moving ahead with a yield increase project that has a negative NPV and therefore passes the financial additionality test would only make financial sense for high ILUC-risk feedstocks.

Note also that the current definition of additionality measure in Article 2(5) of the Delegated Regulation 2019/807 mentions food and feed crops only[59], and this should be broader if the concept is to be used more broadly. It is assumed, for example, that measures to cultivate crops on abandoned or severely degraded land would not be restricted to food and feed crops only.

Regarding the additional biomass calculation, the certification guidance sets out different approaches to set the dynamic yield baseline, depending on whether the crop is an annual or perennial crop or whether sequential cropping is implemented. The perennial crop requires the shape of the yield curve over the lifetime of the crop to be taken into account. The current guidance includes a yield curve specific to oil palm. Other perennial crops would be able to use the steps detailed in the guidance, but would require a different yield curve to be established, specific to the type of crop and how its yield would be expected to develop over the crop lifetime. [60]

Intermediate crops[61] that do not "trigger demand for additional land" can be counted outside the food and feed cap. Whilst this does not formally require low ILUC-risk certification, the approach to calculate additional biomass for sequential cropping included in the low ILUC-risk certification approach could be used to demonstrate that intermediate crops do "not trigger demand for additional land". We recommend that the Commission issues specific guidance on the subject of intermediate crops that can be adopted by voluntary schemes and member states (especially if they are included in Annex IX). Such guidance should clearly define "main crop" and "intermediate crop" (see Appendix D), **clarify that the low**

[59] 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"

[60] A sugar cane case study conducted in the initial preparation of the low ILUC-risk guidance suggested that the annual crop approach could be implemented for sugarcane, despite it technically being a perennial crop, although no pilot project using sugarcane was eventually conducted.

[61] Referred to in the pilots as sequential cropping

ILUC approach to determine additional biomass can be used as part of voluntary scheme certification of intermediate crops, and clarify that intermediate crops would not need to meet the low ILUC-risk additionality criteria.

4.3 Applicability of low ILUC-risk certification to different regions

The pilot projects were conducted across several regions, including Europe (within and outside the EU), South East Asia and Latin America. For most of the pilots, sufficient data was available to carry out the necessary calculations, competent personnel were available – both at the economic operator and auditor levels – and overall pilot companies were relatively well able to collect the required data and fill in the required forms.

Auditors involved in pilot evaluations nevertheless recognised that the amount and accuracy of available data were likely to be above the typical standard of data readily available, since most economic operators involved in pilots are already certified to EC-recognised biofuel voluntary scheme and were chosen because they were likely to have the data necessary to conduct the calculations. Additional biomass calculations were possible because often the pilot participants had already implemented the yield improvement measures and had kept records of their yields. Participants to pilot projects in this study can arguably be considered "best in class".

It is therefore likely that the availability of data and evidence may not be as good outside the context of this study and, may also vary between different regions, especially between EU and non-EU countries. This is particularly the case for yield and land-use data, which the EU requires farmers to collect as part of their duties to receive support in the context of the Common Agricultural Policy (CAP). Nevertheless, the pilots found that this type of data is collected by farmers in regions outside the EU, and also is often required as part of voluntary schemes.

The Uruguay project highlighted the issue that economic operators renting their lands might face more difficulties to access and collect historical data regarding yields or past uses of their land if they are not the land owner or have not rented the same land over a period of time. Similar observations can be expected in other settings where farmers typically do not own their land.

The accuracy and availability of the data shared by economic operators in the context of an audit, and used by auditors to verify compliance, depends on their own capacity to keep records of yields, feedstock prices and costs of additionality measures, which can be complemented by historic data recorded and stored by local, regional or national institutions. These capacities could vary regionally. In addition, farmers already certified to an EU-recognised scheme are expected to be better prepared than non-certified farmers with regards to the implementation of data management systems and preparedness for audits.

The level of awareness, understanding and acceptance of the concepts of ILUC in general, and high and low ILUC-risk certification specifically, varied between the regions and crops. The concepts were introduced to pilot participants who several times questioned the concept of defining high ILUC-risk at a whole feedstock level, claiming that there are regional differences in cropland expansion which would mean their region should not be classed as high ILUC-risk. This was also a point raised when the Delegated Regulation was being drafted. For the implementation of low ILUC-risk certification, this means it is important that the certification is clearly explained in the context of providing an opportunity for farmers to certify additional yield and the implementation of sustainable yield increase practices. Documentation and forms need to be available in local languages to enable farmers to access the mechanism and understand what is required for them for certification.

The pilots also found regional (as well as farmer-specific) differences in typical farming practices. Auditors raised this as a challenge when considering which yield increase measures should be eligible for low ILUC certification and which should be considered business as usual. The mechanism is designed to enable these differences to be taken into account, so a farmer who has the opportunity to increase their yield can do so and get it certified, as long as they can show that the yield increase measures are made possible by the value signal from EU biofuels (i.e. pass the additionality test).

Wherever weather events are particularly extreme (e.g. drought, monsoon, hurricanes, etc.), there is a large variability in yields observed. This can create challenges in setting a "representative" dynamic yield baseline. The project team discussed options that could be further explored to take external factors such as weather into account when setting the baseline. However, feedback from pilot participants and auditors was that the methodology is already complex enough. Introducing additional factors in the calculations would not be helpful for economic operators or auditors.

Therefore, as with feedstock types, the low ILUC approach is generally applicable across all regions, but economic operators may require specific guidance and support in regions where data are less systematically recorded or less reliable. In regions less aware of EU policies, additional support may be needed to explain to farmers the purpose of the certification and what is required from them.

4.4 Applicability of low ILUC-risk certification to different production scales and types of holdings

The pilot projects worked with a range of sizes and scales of operators and types of holding. The Malaysian phase 1 palm pilot and both Colombian palm pilots worked with holdings that had relatively large-scale plantations, with integrated ownership of the palm mill. The phase 2 Malaysia palm pilot worked with a certified group of small holders whose average size was 3 ha. In France, Spain and Uruguay, the farms could be considered medium-size. The French and Spanish farmers were part of farmer cooperatives, although the commercial arrangements varied, and also varied by crop. For example, in Spain the farmers sold some of their crops via the cooperatives but they had contracts to sell camelina directly to the Camelina Company.

As an add-on module to existing voluntary schemes, the low ILUC-risk certification approach is designed so it can be used with any of these set-ups. However, there are important elements that should be considered:

- **Data availability challenges will be larger for smaller farmers, who may also have greater potential to increase their yields:** Larger organisations are more likely than smaller farms to have the data management systems in place to conduct the necessary calculations and access certification. This is a wider challenge recognised for sustainability certification, and will also be the case for low ILUC-risk certification. There is ongoing work by companies and voluntary schemes to try to improve data availability, for example through the introduction of digital apps for farmers to record yield. Increased uptake of these types of technology solutions are also expected to be driven by the trend for corporates seeking improved transparency in their supply chains, for example, driven by policies such as the European Regulation on deforestation-free products.[62]

[62] https://environment.ec.europa.eu/topics/forests/deforestation/regulation-deforestation-free-products_en

- **Administrative burden versus uncertain volumes of low ILUC-risk biomass:** Larger operators taking part in the pilots reported that the burden of implementing low ILUC certification was high in relation to the uncertain benefits due to the relatively small and variable amounts of low ILUC biomass able to be claimed each year. This burden will be even heavier for small holders, albeit they may have a greater potential to increase their yields which may mean they can claim relatively higher volumes of low ILUC biomass.

- **Proving additionality without a direct link to the EU biofuels market:** using the barrier analysis test to prove additionality requires an operator to prove that the barrier was overcome because of a link to the EU biofuels market. This is conceptually easier for an operator or company working directly with an EU biofuels company. Similarly, operators working directly with EU biofuels companies will find it easier to see any direct financial benefit from EU biofuels, which makes the financial attractiveness test more feasible to pass. This is a logical consequence, but the mechanism would ideally avoid a situation that the same action taken in two contexts (one with investment from an EU company and one with investment from a local company outside the EU) is eligible for certification in one context and not in the other, as that would be a bias in favour of EU companies. There may be missed opportunities if operators are required to show a strong link to EU markets, but this has to be balanced against the importance of proving additionality in a robust way to preserve the credibility of the mechanism.

- **Small holders face more inherent barriers but may not have the resources to access certification or prove they comply with the criteria:** Generally, small(er) farms might be more affected by non-financial barriers than larger operators, due to a limited access to knowledge and agronomic expertise, and more limited access to financial reserves, loans, subsidies, etc. In phase 1, large pilot companies described non-financial barriers but evidence was not provided to show that those barriers applied in their case. Barriers are expected to affect smaller operators more than larger operators who can more easily arrange access to finance and inputs, for example. Small holders less than 2 ha are exempt from the additionality test (see section 3.9) but similar barriers will also apply to small farmers. Whilst we do not recommend that the definition of small holders who are exempt from the additionality test is changed, we do recommend that auditors allow more flexibility for small farmers to use the barrier test even for barriers for which a price could in theory be estimated.

- **Using existing group certification infrastructure:** Low ILUC-risk certification approach can be used in a group certification context (and not limited to small holders below 2 ha). The certification guidance recommends that low ILUC-risk certification is used within the existing group certification infrastructure, to minimise additional administrative burden. Therefore the unit of certification could be a first gathering point, mill or central office, who act as a “group leader” in existing EC-recognised voluntary schemes. Group members who wish to make a low ILUC-risk claim need to meet the low ILUC-risk criteria on an individual basis, but the data gathering, calculations, administration and auditing can be coordinated centrally.

- **Integrated feedstock production and first gathering point:** The Colombian palm pilots were both examples where the palm plantation (feedstock production) was integrated in the same company with the mill (first gathering point). Whilst they had good data availability, and did record FFB yield, they did not have access to actual FFB prices as these were not sold. Whereas the draft methodology assumed that low ILUC biomass would be evaluated immediately after harvesting, the Colombian pilot

projects suggest that, in the case of integrated companies (or in the case that the first gathering point manages the low ILUC-risk certification), additional biomass could be measured at the oil mill stage, i.e. when palm fruit bunches are being pressed to produce crude palm oil, which is then refined onsite. It is therefore recommended to allow economic operators the option to determine the baseline and additional biomass on the basis of the raw material harvested (in this case FFB) **or** on the basis of the usable intermediate product.

5. Policy recommendations for Low ILUC

This section describes potential policy options for the Commission to consider to improve the approach to low ILUC-risk certification. Some of the options would entail making updates to the Delegated Regulation 2019/807.

5.1 Additionality test

The additionality test remains a challenging aspect to demonstrate robustly and consistently in the low ILUC-risk methodology. In section 0 the main challenges regarding the additionality are described. This section describes the options that could be considered to increase the robustness of the additionality test and the ability to implement and verify it in a consistent way.

The financial attractiveness test was difficult to pass in all pilots and it may be hard to find projects that are made possible by the relatively weak and uncertain value signal offered by low ILUC-risk certification. A key observation with the financial attractiveness test as currently defined is that the base commodity (biomass feedstock) has a relatively high inherent value. Several of the pilot companies thus said that it is hard to conceive of a yield increase additionality measure that is costly enough that producing additional biomass would not pay back, at least on paper over time, because the increase in biomass feedstock should provide additional income for farmers. That points towards non-financial barriers being more of an issue for farmers who do not already have optimised yields rather than the financial attractiveness of the measure. The low ILUC-risk approach should be designed to help feedstock producers to overcome barriers to increasing yields rather than incentivising the most “expensive” or potentially unprofitable yield increase measures.

The other side to this is that there are many uncertainties in the value proposition from the low ILUC-risk mechanism currently, such as the volume of low ILUC-risk biomass that can be claimed each year, the market premium that might be available for low ILUC-risk fuels, and whether any such premium would reach the feedstock producers. It is unrealistic to expect a farmer to make an investment that has a negative NPV (on paper) without a stronger guarantee of a return on that investment. **The conclusion is that the financial attractiveness test will only work if a strong market signal develops.** That can happen, although, as discussed in section 4.1, as currently defined, there is only an explicit policy driver for high ILUC-risk feedstocks to become low ILUC-risk certified, and that driver is rather weak as low ILUC-risk certified palm biofuel will be competing with biofuel from other food and feed crops within the food and feed cap.

A more nuanced approach should be considered, especially for smaller farms, to use the barrier analysis if costs cannot *reasonably* be estimated. Implementing Regulation 2022/996 says “Any barrier whose cost can be estimated shall be included in the financial attractiveness test…” A more nuanced approach could allow smaller farms who do not always make decisions based purely on financial considerations, to use the barrier analysis if the costs cannot reasonably be estimated.

Facilitate group learning and request transparency from economic operators (via EC-recognised voluntary schemes for biofuels) on which barriers are identified, validated and the type of evidence that was provided to verify the existence of the barrier. There are guidelines and examples of barriers in the certification guidance to support farmers and auditors in the barrier analysis. Nevertheless, the barrier analysis remains subjective and based on the experience, expertise and opinion of the auditor. Transparency on the additionality requirements will be crucial to the credibility of the low ILUC-risk mechanism. To harmonise the methodology and application in practice, transparency and knowledge

sharing is required. Practically, it is recommended that voluntary schemes require auditors and certification bodies to share feedback, experience and recommendations regarding the applicability of the approach. Voluntary schemes can then report that information in a consolidated manner to the European Commission in their annual report so that the low ILUC approach/guidance can be continuously improved at the EC level.

Review the approach to evidence that should be provided to showcase the link with the EU biofuel market. It remains conceptually hard for a farmer producing commodity crops, such as palm and soy, in a global market to prove that the EU biofuels market is the primary driver for applying an additionality measure. This link will be easier to prove for farmers or first gathering points with a direct contract with an EU biofuels producer (or EU farmers producing feedstock for local use to produce biogas that will be used in the EU for energy) over producers without an existing relationship with an EU biofuel producer. To prohibit that the strict interpretation of this requirement results in no or very little low ILUC-certified being possible, a review should be planned to analyse how this requirement can be implemented without bias against local companies who would want to invest in an additionality measure, and how compliance can be achieved, reported and verified. **Still it is important to start with a strict interpretation of the additionality requirements to ensure the risk of damaging credibility by having a weak implementation that might even lead to a call to revoke certificates.**

For the barrier test, the pilots found that auditors did not feel confident to reach unequivocal and objective conclusions as to whether or not the projects would pass the test. Following a very strict approach brings the risk of having no, or very low, volumes of low ILUC-risk biomass being certified on the market, although this is a logical consequence unless and until the market develops a strong value signal for low ILUC certified material.

If the additionality test is made too easy to pass there is the risk of business as usual productivity increases being certified and a situation where a large number of parties are low ILUC-risk certified, even whilst not significantly increasing their yield. Apart from a perception of greenwashing caused by certified parties being allowed to issue low ILUC claims when they have not sufficiently proven additionality, there would also be a significant policy risk if the additionality test is too easy. This is because whilst those certified parties may not produce a large volume of low ILUC-risk biomass on an individual basis (because they have not significantly taken action to increase their yields), if there are a large number of parties certified, natural variations in yield year-to-year could cumulatively lead to a large volume of low ILUC-risk biomass available on the market even without significant actions having been taken. It should be noted that the Implementing Regulation 2022/996 already states that the low ILUC-risk quantities must be included on the certificate and thus publicly available in the future (in contrast to "normal" certified feedstock quantities). The market should therefore provide some transparency as (biofuels) quantities can be calculated. Whilst this may help to identify projects failing to regularly deliver certified low ILUC-risk material, unless information is also published about what the targeted rate of low ILUC-risk production was, it will be difficult to distinguish successful from unsuccessful projects. Auditors need to check in follow-up audits that additionality measures have been taken as described. **Low ILUC-risk certification should aim for as high a level of transparency as the market will allow to ensure that credibility in the mechanism can be built.**

Currently the Delegated Regulation 2019/807 allows for certification of projects and operators having implemented additionality measures up to 10 years in the past, if all the low ILUC-risk criteria can be met. The pilots showed that farmers had good data records and in almost all cases, good quality historic data was available, which were sufficient to allow the pilot companies to perform the required calculations and for auditors to audit those calculations. However, the fact that the measures were implemented prior to the introduction

of low ILUC-risk certification made the additionality test conceptually difficult to pass because the measures either were financially attractive or barriers had already been overcome. **Therefore the certification of additionality measures taken in the past will be difficult in all but exceptional cases because it will be hard to pass the additionality test (unless the project is exempt from the additionality test, which includes abandoned or severely degraded land or small holders <2ha).**

5.2 Dynamic yield baseline

The most common error calculating the dynamic yield baseline in the pilots was in implementing the global trendline or "slope" element of baseline. In all pilots, the pilot participants experienced difficulties, made mistakes or simply missed out applying the global trendline – or "slope" – element of the dynamic yield baseline. The experience from the pilots showed that the global trendline makes only a small difference to the absolute level of the baseline, and is generally less than the natural variation in yields. However, it is a core component of the low ILUC concept, to ensure that only yields above what would be expected in a business as usual situation are claimed as low ILUC-risk. Therefore, the certification guidance provides worked examples with step-by-step instructions to set the dynamic yield baseline. Auditors need to pay careful attention in the baseline audit to make sure all steps have been correctly followed.

Allow operators the option to determine the baseline and additional biomass on the basis of the raw material harvested (e.g. FFB) or on the basis of the usable intermediate product (e.g. total oil yield from the mill – CPO plus PKO). Whereas the draft methodology assumed that low ILUC biomass would be evaluated immediately after harvesting, the Colombian pilot projects suggest that, in the case of integrated companies (or in the case that the first gathering point manages the low ILUC-risk certification), additional biomass could be measured at the oil mill stage, i.e. when palm fruit bunches are being pressed to produce crude palm oil, which is then refined onsite. The economic operator must ensure that the relevant data/ documentation (e.g. CPO yield) is provided from the company conducting the processing step and that this can be verified. The certification guidance will allow the option for economic operator to conduct the calculations on the basis of the mass of the final usable product (e.g. crude palm oil), as long as impacts on other co-products are taken into account. The baseline and additional biomass calculation need to be on the same basis for an economic operator and applied consistently over time.

Need for more guidance for setting a baseline using the low ILUC-risk methodology for perennial crops other than palm. Some stakeholders commented that the application of the methodology to set the dynamic yield baseline is not fully defined for perennial crops other than oil palm (e.g., coconut or pongamia). A normalised standard growth curve is needed to set a dynamic yield baseline for yield increase projects involving perennial crops. Currently the guidance only includes a standard growth curve for oil palm, as this is the only high ILUC-risk feedstock at present. If there is demand to certify yield increase projects for other perennial crops, we recommend that the European Commission either:

a) provides the standard growth curves for these crops or

b) delegates the provision of the standard growth curves to the voluntary schemes as part of the low ILUC-risk certification process.

The European Commission should provide clear guidance on the definition of 'intermediate crop' and clarify how biomass produced from intermediate crops can be demonstrated in practice for exemption from the food and feed cap and inclusion in

Annex IX, drawing from the methodologies in the low ILUC-risk certification guidance. Calculating additional biomass from sequential cropping, as tested in the pilots, is primarily useful to identify additional biomass from intermediate crops that can be counted outside the food and feed cap and potentially in Annex IX (rather than for the purpose of claiming low ILUC-risk biofuels, as no high ILUC-risk crops are typically grown as a second crop). Intermediate crops would not have to pass the additionality requirements to be outside the food and feed cap or included in Annex IX. **The low ILUC-risk methodology to calculate additional biomass from sequential cropping should be used by voluntary schemes to verify that intermediate crops do "not trigger demand for additional land", as required by both the food and feed crop exemption and the proposed Annex IX definition.**

Natural variations in yield and the fact that even simple crop rotation patterns lead to situations where the yields of different crops need to be compared, leads to the recommendation that observed yield is not the primary indicator that should be used to assess if intermediate crops do "not trigger demand for additional land". It is recommended that the growing season of the main crop is used as the main indicator to demonstrate whether the intermediate crop impacts the yield of the main crop. If the growing season of the main crop is unchanged after the introduction of the intermediate crop, then the whole yield of the intermediate crop should be counted. If the growing season of the main crop is changed, then any yield impact on the main crop as a result of the intermediate crop needs to be compensated in the volume of the intermediate crop that can be counted. That compensation should be based on a "multiple baseline" approach which enables the comparison of crop yields on a like-for-like basis and any comparison for main crop yield loss should be based on energy content. When there are different crops involved in a rotation, and one crop influences the yield of another, there can never be a perfect substitution or compensation. Different crops have different components (e.g. oils versus protein versus starch) and even within the same crop types, different oils or proteins for example have different properties and markets. **Evaluating additional biomass based on energy content is considered to offer the best basis for comparison as it offers the best balance between ease of calculation and applicability**.

If intermediate cropping is the additionality measure, then the additional biomass is considered to be the intermediate crop itself. Due to the above-mentioned high natural variation in yield and the aim to simplify the methodology to determine additional biomass, we recommend that operators cannot claim any upside in the main crop yield as additional biomass in the case of intermediate cropping.

Further reflections and recommendations on the definition of intermediate crop is included in Appendix C.

5.3 Severely degraded land

This section describes the policy recommendations, based on the severely degraded land pilot and literature review.

Proposed thresholds for low ILUC-risk certification for severely degraded land should be set at a more modest level, but to counter that the farmer should either be required to prove there is no existing yield or to set a yield baseline, based on current yields (the baseline is zero if the farmer can show that there is no yield). The feedback received so far (including from the stakeholder consultation) is that the degradation thresholds proposed in the draft certification guidance are too strict and that it is unlikely to be possible to cultivate crops on lands that would meet those thresholds. This would result in little to no low ILUC-risk feedstock possible from severely degraded lands. It would also not provide an incentive for farmers whose land is becoming degraded (but not yet degraded

enough to meet the strict thresholds) to change their current practices and reverse the degradation.

A further point noted from the Spanish pilot study on degraded land and additional literature research, is that what might be considered severely degraded is dependent on soil type and climatic regions. For example, some soils or regions are naturally low in soil organic carbon or naturally salinated. Setting one absolute threshold to define severely degraded land in all contexts does not cover the differences in soil types or regions. However, setting differentiated thresholds for different soil types and regions would become very complicated. Policy makers or voluntary schemes would have to set differentiated thresholds up-front, based on soil types and/or climatic regions. Alternatively, the decision whether or not land classifies as severely degraded could be left to a local auditor who would know the local context, but that would require a high level of auditor specialisation and would lead to inconsistent application of the definitions. A further alternative would be for member states to establish maps of severely degraded land that could be eligible for low ILUC certification. Whilst this would be a very helpful step to provide certainty and guidance for the market, it would require a significant effort from member states and does not avoid the need for the Commission to define appropriate degradation thresholds.

Setting more modest thresholds would allow land to be certified before it becomes impossible to cultivate. This would both allow to reverse the degradation of plots that are becoming degraded to take earlier steps to restore soil quality and improve yields, and it would allow more flexibility and inclusivity to determine the degradation of agricultural plots, regardless of climatic region and soil type.

The draft low ILUC-risk certification guidance included thresholds of <1% SOM and severe signs of erosion on 25% of the land surface or >8 dS/m electroconductivity for significantly salinated land. Following the phase 2 pilot, a more modest threshold could be proposed of <3.4% SOM and >1.5 t/ha/y soil loss for erosion (using maps) or photographic evidence to show signs of erosion, or >4.0 dS/m electroconductivity for salinated soil. Table 5 compares the draft stringent and proposed modest thresholds, with the rationale for the newly proposed more modest values.

Table 5. Draft and recommended thresholds for severely degraded land

Criteria	Draft Certification threshold (stringent)	Proposed threshold (modest)	Rationale for proposed value
Significantly low soil organic matter content	<1%	<3.4%	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	All topsoil has been removed + 25% of the area of the plot show signs of erosion	>1.5 t/ha/y soil loss, proven using maps or photographic evidence	Stopping erosion before it is irreversible
Significantly salinated	>8.0 dS/m	>4.0 dS/m	Similar values to literature and JRC's LUCAS project

To ensure that the baseline of zero yield is only used in appropriate cases, we suggest that if the more modest proposed thresholds are chosen for severely degraded land, then operators should set a yield baseline for cases of severely degraded land with pre-existing yield. The low ILUC-risk approach is designed to certify "additional biomass". Sometimes land is degraded, but still has a crop growing on it. It was

even reported by the auditor in the degraded land pilot that it is typical in the EU for degraded farmland to still produce some yield, as this makes it eligible to receive direct payments under the Common Agricultural Policy (CAP). Therefore, if more modest thresholds are set for establishing degradation status, this is more likely to enable the certification of land that already has some yield. Therefore it is recommended to require farmers to set a dynamic yield baseline (following the appropriate methodology already included in the low ILUC-risk certification guidance). **For land that is not currently under cultivation, the baseline would still be zero and all yield would count as low ILUC-risk additional biomass.** Requiring a dynamic yield baseline to be set in cases where there is an existing yield would ensure that only additional biomass could be claimed as low ILUC-risk and the claim would not be applied to already existing yield, in line with the overall low ILUC approach. This approach would prevent existing yield being claimed as low-ILUC risk and support farmers to take measures to improve soil quality and reverse degradation that is already happening.

Under this approach, farmers who comply with the proposed modest thresholds would still be exempt from proving compliance with the additionality test, which would not be the case if the strict thresholds are kept and increased productivity on less degraded land was treated as a yield increase measure. Table 6 below compares three policy options regarding the level of the thresholds and whether farmers should set a dynamic yield baseline.

Table 6 Policy options for degradation thresholds and pre-existing yield

	Policy option 1	Policy option 2	Policy option 3
	Stringent thresholds (Draft Certification Guidance)	**Modest thresholds & proof of no existing yield (severely degraded land as subset of unused land)**	**Modest thresholds & requirement to set dynamic yield baseline**
Severity thresholds	Strict thresholds	Lower thresholds (new)	Lower thresholds (new)
Pre-existing yield eligible	✓	✗	✗
Potential land eligible	Little land will be eligible	Little agricultural land will be eligible	More (agricultural) land will be eligible
Consistent with current legislation	✓	✗	✗
Pro	• Legislation will not have to be amended • Ensures only the most degraded land is eligible	• More land will become eligible due to lower thresholds • Proving that there is no existing yield means that only new cultivation is eligible and pre-existing yield is excluded	• More land will become eligible due to lower thresholds • Setting a baseline ensures pre-existing yield is excluded • Incentive to intervene and halt degradation
Con	• Little yield will be available • Unlikely that farmers will choose this option, due to the costs and difficulties of restoring this degree of degradation • Any pre-existing yield will automatically become eligible too	• Legislation will have to be amended: severely degraded land defined as subset of unused land • Little unused land available in Europe due to CAP subsidies, farmers will try to cultivate the minimum to receive payments	• Legislation will have to be amended: severely degraded land has to set a baseline • Higher administrative burden to set a baseline

An additional policy option could be to set modest thresholds and allow a baseline of zero, regardless of whether or not there is any existing yield. This would invite additional low ILUC-risk biomass, as more (productive) farmland could be considered severely degraded. Any existing yield on degraded land can be expected to be relatively low because of the poor soil quality. Therefore allowing farmers to count that pre-existing yield as low ILUC-risk biomass, in addition to any yield increase achieved, would encourage such farmers to take

steps to reverse the degradation and become low ILUC-risk certified by in effect giving them a small additional biomass "bonus". However, JRC reports that 39% of arable land in the EU and UK are estimated to be vulnerable to erosion.[63] If all existing yield prior to low ILUC-risk certification could be considered additional biomass, then it is possible that a large area of arable land could be eligible. It is therefore recommended that for the integrity of the low ILUC system, farmers should either prove there is no existing yield or they should set a dynamic yield baseline and only be allowed to claim above-baseline yield to ensure that only additional biomass can be claimed as low ILUC-risk.

Measures to grow crops on severely degraded land should avoid significant chemical inputs which would be at the expense of soil health and GHG emissions. The definition of additionality measure in the low ILUC-risk approach does require measures to be conducted "in a sustainable manner". However this is not further defined. The REDII does not include specific sustainability criteria related to chemical inputs. Auditors of severely degraded land should ensure that measures taken to cultivate crops do not entail significant use of chemical inputs, which could risk soil health and mean that biofuels would not meet the GHG saving threshold in the REDII. It is especially important to ensure careful use of synthetic fertilisers on soils with low soil organic carbon as low organic carbon soils can emit a disproportionately higher amount of nitrous oxide following fertiliser use.

It should be considered to allow low ILUC-risk certification for severely degraded land to be valid for more than 10 years. If re-certification of land after the initial 10-year certification period is dependent on the land still being classed as severely degraded, this may lead to a perverse incentive for farmers to keep the land in a degraded state. This could be avoided either by granting low-ILUC certification for severely degraded land for more than 10 years, or by explicitly requiring farmers on severely degraded land to take measures to improve the status of the soil. Additionally, a farmer looking to bring severely degraded land into cultivation might require several years to restore the land to the point where cultivation of crops is possible. Allowing for more than 10 years certification would give the farmer more security to undergo this time investment. The same argument could be made for abandoned land, depending on how long the agricultural land was abandoned and the current state of the plot. Extending the longevity of the certification is especially relevant for crops whose lifespan extends beyond the duration of the certification, such as oil palm, which takes 5-8 years before a new oil palm tree starts to produce any significant yield. Thus if a time investment is needed to restore the land then there is little incentive to undergo low ILUC certification as a majority of the eligible yield would occur after the initial 10-year period has ended.

Consistent and clear definitions are needed for severely degraded land across different policy applications. Biofuels made from biomass grown on severely degraded land are eligible to claim a 29 gCO_2/MJ bonus according to EU RED II Annex V (see below) and are further proposed to be added to the Annex IX list of advanced biofuel feedstocks, which would allow their contribution to renewable energy target to count double[64]. In each case the definition mentions severely degraded land, but with slightly different conditions. None of the definitions set measurable degradation thresholds or include indicators for the identification of this land category.

The 29 gCO_2/MJ bonus for cultivating on severely degraded land is described in Annex V Part C paragraph 8 of REDII as follows:

[63] https://joint-research-centre.ec.europa.eu/jrc-news-and-updates/novel-assessment-shows-vulnerability-arable-land-soil-erosion-across-europe-2022-10-27_en

[64] https://ec.europa.eu/info/law/better-regulation/have-your-say/initiatives/13484-Biofuels-updated-list-of-sustainable-biofuel-feedstocks_en

"The bonus of 29 gCO_2eq/MJ shall be attributed if evidence is provided that the land: (a) was not in use for agriculture or any other activity in January 2008; and (b) is severely degraded land, including such land that was formerly in agricultural use."

Low ILUC-certified operators producing biomass on severely degraded land would have to meet the core REDII land-related criteria but would not be required to prove that it "was not in use for agriculture… in January 2008". **Therefore, low ILUC certification would not make biomass produced on severely degraded land automatically eligible for the 29 gCO2eq/MJ GHG bonus.** We interpret the intention of point (a) (*was not in use for agriculture or any other activity in January 2008*) to be **to target land that is currently not being cultivated** (as the text of the REDI was originally drafted in 2008). However, with the reference date now 15 years in the past, land that was not cultivated in 2008 could be producing yield today so having a reference date in 2008 is not the best way to achieve the aim that severely degraded land is not currently being cultivated. The reference date also potentially does not align well with point (b) (*… including such land that was formerly in agricultural use*) and it is unclear whether "formerly" should mean before 2008 or simply any time before today, or if it should be interpreted to mean that the definition includes the low ILUC definition of unused land.[65]

The proposed addition to REDII Annex IX Part A point (t) includes a sub-set of biomass grown on severely degraded land, namely:

"Non-food crops grown on severely degraded land, not suitable for food and feed crops"

The rationale for excluding food and feed crops from Annex IX Part A may be to ensure that feedstocks are not included in Part A that can be processed via mature technologies (transesterification or fermentation), in line with REDII Article 28(6). Nevertheless, point (t) limits crops that could be counted in Annex XI to non-food crops, whereas low ILUC certification does not place any restrictions on the type of crop that is eligible to be claimed. Furthermore, in the Annex IX definition, it is unclear whether the land or the crop has to prove it is "not suitable for food and feed crops". If this refers to the land, it is unclear what type of land that is intended to mean. **Therefore, low ILUC-risk certified material from severely degraded land might not automatically be eligible to count in Annex IX**.

Conversely the 29 gCO_2/MJ bonus and Annex IX do not explicitly include the concept of "additional biomass", which is fundamental to low ILUC certification. Whilst low ILUC-risk severely degraded land is exempt from the additionality test, as discussed above, the current approach does not necessarily prevent existing yield on the land being claimed as low ILUC-risk.

In summary, it is unclear exactly which types of land are eligible for which type of severely degraded land policy classification (Annex IX, 29 gCO_2/MJ bonus, Low ILUC-risk certification). It is important for the Commission to make the definitions clear to enable robust and consistent implementation and to align the definitions where appropriate, as it will cause significant confusion in the market and for voluntary scheme certification if different types of severely degraded land claims need to be certified, passed down supply chains and counted differently by economic operators and Member States.

Table 7 below gives an overview of the subtle differences in nuance and aim. The severely degraded land definition as presented in the Renewable Energy Directive has the focus of soil thresholds, explicitly naming salinisation, soil organic carbon and erosion. The criteria for

[65] '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;

the GHG bonus relate to the status of the land and whether it was in use for agriculture in 2008. Although the proposed addition to Annex IX mentions both the feedstock grown on the land and whether the land is suitable for food and feed crops, it is not further defined what that suitability might entail (soil health or land status). Even though the nuance and angle of the definitions differ, the general aim remains the same – stimulating additional biomass from severely degraded land.

We recommend that the Commission sets clear and consistent definitions and thresholds that can be used in all situations, and where possible to be consistent with other Commission initiatives including the Common Agricultural Policy and upcoming EU Soil Health Law. The Low ILUC-risk certification methodology could be used to prove that land is severely degraded and that biomass is additional (subject to the policy recommendations above) in all contexts, subject to clarity on the definitions.

Table 7 Comparison of severely degraded land definitions across existing legislation

Legislation	Definition	Feedstock/ crop criteria	Soil thresholds	Land status criteria
Low ILUC-risk certification. Delegated Regulation 2019/807 refers to REDII definition (Annex V, Part C (paragraph 9))	*"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"*	✗	✓	✗
GHG Bonus criteria (REDII Annex V, Part C (paragraph 8))	*As above, and "a) was not in use for agriculture or any other activity in January 2008; and (b) is severely degraded land, including such land that was formerly in agricultural use"*	✗	?	✓
Proposed addition to REDII Annex IX Part A, point (t)	*"Non-food crops grown on severely degraded land, not suitable for food and feed crops"*	✓	?	?

5.4 Justification for the small holder exemption

The exemption of small holders from the additionality test aims to limit the administrative burden for small farmers and support their yield increase measures. Stakeholders confirmed that small farms experience several factors that often limit their yield and inherent barriers related to their size and operating model when it comes to increasing yield. These include poor quality trees that needed to be replanted, knowledge constraints on good agricultural practices, constrained access to inputs (e.g. no market access or financial access for fertilizers), constrained access to the market (e.g. due to infrastructure or climatic constraints such as the rain season), and limited access to labour as often labour is provided by the family.

These inherent small farm barriers are not limited to the 2 hectare threshold. Small farms of 3-5 ha will experience similar barriers to increase their yield as the 2 hectare small holders. Stakeholders from different continents have consistently said that the definition of small holders below 2 hectares is very small and there are a lot of small farms larger than 2 hectares that would struggle with the low ILUC-risk methodology

The question remains from which scale the certification effort, and more specifically passing the additionality test, becomes the limitation for small farms to become low ILUC-risk certified? The current threshold of 2 ha limits the number of farms that are exempt from the additionality test and is smaller than most other definitions of small holder used in the sector. Nevertheless, a significant volume of global palm production comes from small holders less than 5 ha. Increasing the size threshold would mean a large share of global palm production could be exempt from the additionality test (noting that farms exempt from the additionality test still need to comply with the other requirements of low ILUC-rick certification, including taking an additionality measure, calculating a baseline against which additional biomass is compared and complying with the core REDII sustainability criteria).

Whilst it is likely that small holders will find the low ILUC-risk certification mechanism harder to access compared to larger companies because of the administrative requirements, this issue is not unique to low ILUC-risk certification. The volume of palm oil that is produced by small holders is potentially a large share of global production and **we therefore recommend maintaining the current the threshold for the small holders' exemption. However, as described in section 0, a future review of the Delegated Regulation could consider a more nuanced approach whereby smaller farms who do not always make decisions based purely on financial considerations could be allowed to use the barrier test for additionality even if a financial cost can in theory be put on a measure.**

To help small holders access certification, we recommend voluntary schemes to use low ILUC within their existing group certification approach. Whilst group members need to meet all criteria, if group members are similar, taking similar measures in a similar region etc, the administration can be somewhat streamlined. With the improvements to the barrier analysis, making it more objective, the administrative burden for small farms is limited to the extent possible.

Appendix A. List of accompanying project deliverables

This following documents are also published as outputs from this project: The documents will be available on the project website: https://iluc.guidehouse.com/

- Low ILUC-risk certification documents
  - Certification guidance
  - Management Plan template
  - Audit checklist template
- Ten pilot reports (phase 1 and 2)
- Standard palm curve paper, 6 April 2022
- Webinar slides:
  - Low ILUC Introductory Stakeholder Webinar, 19 Nov 2020
  - Low ILUC Stakeholder Webinar – first pilot results, 19 May 2021
  - Final Webinar (to be published)
- 2022 Stakeholder consultation summary
- Frequently asked questions

Appendix B. Overview of updates to certification guidance at end of phase 2 (since 2022 draft version)

The following table gives an overview of updates to the final low ILUC-risk certification guidance, compared to the version that was published for public consultation in 2022. Other changes, e.g. corrections of spelling mistakes, are not listed. The guidance itself is published as a separate document.

Table 8 Overview of updates to low ILUC-risk certification guidance

Summary of changes made from Version 0.8 to the current version	Chapter (new)
Updated to refer to IR 2022/996	1
Addition: Certification guidance as add-on to certification by an existing EC-recognised voluntary scheme	2
Addition: Decision tree to show the requirements and the steps for low ILUC-risk certification	3
Addition: Update to IR 2022/996. Further information and guidance on the auditing process (baseline audit, annual audit)	3.1.1
Addition: Update to IR 2022/996. Clarifications and further information on the management plan (e.g. sustainability of the additionality measure, estimation of additional biomass)	3.1.2
Chapter: Sustainability requirements (previously 3.3). Clarification on the sustainability of the additionality measure added	3.2
Addition: Update to IR 2022/996. Further information on the list of additionality measures and the requirements to add new measures	3.4.1
New headline. Update to IR 2022/996. Proving additionality: guidance, in which cases the financial attractiveness test or the non-financial barrier analysis shall be used	3.4.2
Addition: Update to IR 2022/996. Further information on conducting the financial attractiveness test	3.4.2.1
Addition: Update to IR 2022/996. Further information on conducting the non-financial barrier analysis. Definition of "First-of-a-kind measure". Proving the link to the EU biofuels market. Including a "verification guidance" to support companies, VS and auditors	3.4.2.2
Addition: Update to IR 2022/996. Further information on the exemption from proving additionality. Update of the overview on unused land subcategories and consequences for the determination of additional biomass	3.4.3

Minor adjustment on the evidence to be supplied to demonstrate that land is abandoned	3.4.3.1
Addition: Sub-chapters land categories updated. Introduction of thresholds for severely degraded land and requirement for severely degraded land that has had some yield to set a dynamic yield baseline	3.4.3.2
New Chapter: Soil sampling	3.4.3.4
Addition: Update to IR 2022/996. Additional biomass can be determined based on raw material harvested and/ or "usable intermediates". New figure to show main principles for the determination of additional feedstock	3.5
Adjustment: Update to IR 2022/996. Determination of the dynamic yield baseline for annual and perennial crops. Updated figures. Global trendline data (factors to use to set the dynamic yield baseline slope) are updated in line with latest FAOSTAT+ data	3.5.1, 3.5.2
Addition: Further information for the determination of additional biomass for perennial crops. Additional guidance for palm oil. More information for group certification approach. Updated guidelines for sugarcane and other perennial crops	3.5.1.2
Deleted: Section on “Sequential cropping”	3.5.1.3
Adjustment: Update to IR 2022/996	3.5.2
Deletion: Chapter on "Verification tools"	
Minor adjustment on the wording in the chapter "Audit preparation and conduct"	4, 4.1-4.4
Deletion of duplicate text sections on baseline and annual audits	4.5
New headline. Update to IR 2022/996. Providing guidance on the low ILUC-risk certificate	4.6
Addition: Further guidance for group certification. Requirements for sub-group certification	5.1
Deletion of parts of sub-chapter on small holders that included duplication (Duplication with other text parts, VS requirements)	6
New: Appendix I: Worked examples for how to calculate dynamic yield baseline and additional biomass	

New: Appendix II: Worked examples of NPV	
New: Appendix III: Soil sampling protocol	
New: Appendix IV: Further guidance on small holder certification	
Deletion: Annex: Examples for how to exclude outliers in the determination of a dynamic yield baseline	

Appendix C. Reflection role of Low ILUC-risk certification for intermediate crops

Intermediate crops offer a potential source of sustainable feedstock for biofuel, bioliquid and biomass fuel production that does not require additional land, **but the current lack of clear terminology hampers practical implementation by Member States and voluntary schemes**. It is possible for the same type of crop to be grown either as a main crop or intermediate crop, meaning that physically distinguishing main crop from intermediate crop is not always possible and economic operators will rely on robust definitions to determine whether a crop is grown as an intermediate crop. Therefore, the aim of this chapter is to reflect on how intermediate crops can be distinguished from main crops.

C.1 Policy context

The cap on the use of food and feed crops in the REDII is in place to limit the displacement of crops for food and feed purposes by the cultivation of crops for biofuels, bioliquids and biomass fuels. An increase in demand for food and feed crops for biofuels could lead to existing crops being displaced onto other land. Where agricultural land encroaches into high carbon stock areas such as wetlands, peatlands and forests, this causes an increase in greenhouse gas emissions which can negate the positive GHG benefits from using biofuels in place of fossil fuels – the ILUC effect. The diversion of food and feed crops to biofuel use can also put upward pressure on agricultural commodity prices, with potential negative implications for food security.

To limit this, Article 26 of the REDII caps the use of biofuels, bioliquids and biomass fuels used for transport sourced from food and feed crops to a maximum of 7%, or to 1% higher than the share of these fuels in the final transport energy consumption of the individual member state in 2020, if that is lower than 7%. **Intermediate crops can be counted outside this limit.** Article 2, paragraph (40) of the REDII defines the term 'food and feed crops' as follows – the definition includes the terms 'main crop' and 'intermediate crop':

"*starch-rich crops, sugar crops or oil crops produced on agricultural land as a **main crop** excluding residues, waste or ligno-cellulosic material and **intermediate crops, such as catch crops and cover crops, provided that the use of such intermediate crops does not trigger demand for additional land**"* (emphasis added)."

Additionally, a subset of intermediate crops (referred to as ley and cover crops) is included within the definition of point (p) "Other non-food cellulosic material" in Annex IX Part A of the REDII, meaning they can be counted towards the advanced biofuel sub-target. REDII Article 2(42) defines this as:

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

Some of the most promising crops that can be grown in a short fallow period without disturbing the main crop are cellulosic crops (such as sun hemp) and these would **already be in Annex IX Part A.** On 5 December 2022, the European Commission published a proposal to **amend Annex IX** to Directive (EU) 2018/2001 (RED II)[66], **where a second group of 'intermediate crops' are proposed to be included in Part B**, as follows:

*"**Intermediate crops**, such as catch crops and cover crops that are grown in areas where due to a short vegetation period the **production of food and feed crops is limited to one harvest** and provided their use **does not trigger demand for additional land** and provided the **soil organic matter content is maintained**."*

Compared to the definition of intermediate crops in REDII Article 2(40) this introduces two new concepts to be able to claim that a crop is an intermediate crop: that (without the intermediate crop) the production of food and feed crops is limited to one harvest (per year) and that soil organic matter content is maintained.

The Fit for 55 Package that the European Commission published in 2021 includes proposals to further update the legislation including a proposal for a 'REDIII', FuelEU Maritime and ReFuelEU Aviation.

- FuelEU proposes a GHG emissions reduction target for the maritime sector and does not further specify or limit feedstocks, as long as the fuel is less carbon intensive than the fossil fuel comparator. However, under FuelEU food and feed crops are counted the same GHG performance as the worst performing fossil fuel, thus in practice there is no incentive from FuelEU to use these feedstocks in the maritime sector. Annex IX Part A feedstocks are allowed for use under FuelEU.
- ReFuel Aviation includes a blending obligation target for sustainable aviation fuels, which explicitly excludes food and feed crops, palm and soy derived materials and any intermediate crops not included in Annex IX of the RED.
- Since "ley and cover crops" consisting of a grass-legume mix with a low starch content are in Annex IX Part A and 'intermediate crops' that do not trigger demand for additional land are in the proposed additions to Annex IX Part B[67], they could potentially be used to reach the targets in both ReFuel and FuelEU.

The Biomethane Action Plan within the REPowerEU plan[68] recognizes a role for sustainable biomass from '**sequential or cover cropping**' for biomethane production. No definitions are included in the plan.

The Low ILUC-risk certification methodology[69] could be suitable to prove that intermediate crops that could be included in Annex IX Part B do not trigger demand for additional land, as it can be considered a way of producing additional yield from the land. Under the low ILUC-

[66] https://ec.europa.eu/info/law/better-regulation/have-your-say/initiatives/13484-Biofuels-updated-list-of-sustainable-biofuel-feedstocks_en

[67] COMMISSION DELEGATED DIRECTIVE (EU) .../… amending Annex IX to Directive (EU) 2018/2001 of the European Parliament and of the Council, as regards adding feedstocks for the production of biofuels and biogas https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=pi_com%3AAres%282022%298413323

[68] Staff Working Document 2022(230) Implementing the REPowerEU Action Plan: Investment needs, Hydrogen accelerator and achieving the biomethane targets

[69] Annex VIII of Commission Implementing Regulation (EU) 2022/996 of 14 June 2022 on rules to verify sustainability and greenhouse gas emissions saving criteria and low indirect land-use change-risk criteria https://eur-lex.europa.eu/eli/reg_impl/2022/996/oj

risk certification approach, a farmer could either prove there is no impact on the yield of the main crop and thereby claim all the second crop as additional biomass, or calculate the yield impact on the main crop and apply that to the volume of additional (low ILUC) biomass that can be claimed.

Note that the low ILUC-risk criteria also include a requirement for an economic operator to prove "additionality" for yield increase measures, as per Delegated Regulation (EU) 2019/807 Article 5(1)(a)(i)[70]. There is no explicit requirement to prove additionality for intermediate crops in Annex IX.

C.2 Proposed definition recommendation

This chapter outlines a proposed definition for main crops and intermediate crops, in addition to the Annex IX proposed definition, resulting from reflections related to the various pilot outcomes and based on stakeholder interactions. Table 9 below outlines several characteristics needed in the definition of main crop and intermediate crop. The core criteria come directly from the REDII definition of food and feed crop. The potential guiding criteria are based on an interpretation from the project team on the intended differences between main and intermediate crops. The following sections describe the criteria in greater detail.

Table 9 Characteristics definition intermediate crop and main crop

Main crop	Intermediate crops
Core criteria	
a) Starch, sugar, oil crops b) On agricultural land	f) Any crop grown before or after the main crop on the same agricultural land[71] g) Does not trigger demand for additional land h) Maintains soil quality
Potential guiding criteria	
c) Highest economic value d) Occupying the land during the most favourable conditions e) Occupying land for the longest time	i) Lower economic value j) Shorter growing period than the main crop k) Occupying the land during the 'worst' growing period

For main crop, we recommend including both core criteria and at least one guiding criteria. The definition of main crop comes directly from the definition of food and feed crop in REDII Article 2(40). Therefore the core criteria are:

1. **a starch, sugar or oil crop**, and;
2. **grown on agricultural land**.

[70] Article 5(1) of the DR 2019/807 is the so-called "Additionality" clause. It stipulates that biofuels, bioliquids and biomass fuels may only be certified as low ILUC-risk if the additionality measures "become financially attractive or face no barrier preventing their implementation only because the biofuels […] can be counted towards the targets for renewable energy" in the REDII.

[71] Intercropping (growing an additional crop alongside the main crop) could also count in theory, although as two crops are grown side by side it would be more likely to impact the yield of the main crop and therefore trigger demand for additional land,

Note that 'starch crop' is defined in Article 2(39) of REDII and 'oil crops' are defined in Article 2(1) of the ILUC Delegated Regulation. 'Sugar crops' are not currently defined.

However, these two core criteria are only sufficient if there is only one crop grown in a harvest year and it is possible in some contexts to have more than one main crop in a year. The proposed definition of intermediate crop to be included in Annex IX Part B therefore includes the concept "*grown in areas where due to a short vegetation period the production of food and feed crops is limited to one harvest"*, to prevent a main crop being claimed to be an intermediate crop in a case where the climate and conditions can support the cultivation of more than one fully-mature main crop to be grown.

If more than one crop is grown in a harvest year, it is advised to combine the above two core criteria with **at least one** of the following guidance criteria[72] to distinguish whether a crop is a main crop:

1. **Highest economic value**. Since this would influence the farmers behaviour and decision to grow which crop. This could be based on the individual farmers revenue or the regional market price. However, there are many factors that play into the economic value of a particular crop, such as the CAP subsidies and market price fluctuations (e.g., if a bioenergy crop gained significant value due to its status outside the food & feed cap / Annex IX, this could make the intermediate crop more valuable than the main crop). This criterion is derived on the Decision on agricultural definitions (2000/115/EC), Annex I Article D II.

2. **Occupying land during the most favourable growing conditions**. To maximise yield, the main crop is usually grown in the period of the year with the most favourable growing conditions. This could be demonstrated by average regional fallow periods and regional average growing periods of the main crops in the region. Which part of the year offers the most favourable growing conditions will vary depending on the climate and region. This criterion is derived in the 'Draft Decree Relating To Crops Used For The Production Of Biogas And Biofuels' (France). [73]

3. **Occupying land for the longest time**. To maximise yield, the main crop is usually left on the land for the longest period. This could be demonstrated with average sowing and harvesting dates but would need some flexibility to allow for weather events. In case of long fallow periods that span over a harvest year, this would not be a suitable metric. This criterion is derived from the Decision on agricultural definitions (2000/115/EC), Annex I Article D II[74] and Decree Relating To Crops Used For The Production Of Biogas And Biofuels (France). However, there can be cases where a cover crop is left on the field for a long period of time, so this criterion may only be needed the other guiding criteria to not prove conclusive.

(Note that the guiding criteria for intermediate crops are simply the inverse of those for the main crop.)

[72] Derived from Decision on agricultural definition (2000/115/EC)

[73] Decree No. 2022-1120 of August 4, 2022 relating to crops used for the production of biogas and biofuels https://www.legifrance.gouv.fr/jorf/id/JORFTEXT000046144291 (French)

[74] 2000/115/EC: Commission Decision of 24 November 1999 relating to the definitions of the characteristics, the list of agricultural products, the exceptions to the definitions and the regions and districts regarding the surveys on the structure of agricultural holdings https://eur-lex.europa.eu/legal-content/EN/ALL/?uri=CELEX%3A32000D0115

For intermediate crops we recommend including all three core characteristics (Table 9). Inferred from the definition in REDII Article 2(40), we recommend that an intermediate crop is **any type of crop** that meets the following **three core criteria:**

1. **Any crop grown before or after the main crop on the same agricultural land**. This criterion is inferred from the REDII definition of food and feed crop (Article 2(40)) and proposed amendment of Annex IX of the REDII.

2. **Does not trigger demand for additional land**, as mentioned in Article 2(40) of REDII and proposed amendment of Annex IX of REDII. This would avoid displacing crops that are going to other existing markets to minimize the risk of ILUC. This could be demonstrated by either proving that it has no impact on the main crop yield or that it is grown on land that would otherwise have been unproductive. However, no impact on the yield of the main crop is difficult to prove by direct comparison of yields as yields naturally vary year-on-year, even without intermediate cropping.

    a. The focus should be to prove that the land would have been unproductive and that the intermediate crop does not disturb the growing and harvesting cycle of the main crop. There would need to be some flexibility to allow for slight natural variations in the growing season (for example, sowing and harvesting is often done over a 4 to 6 week period because of logistics / weather). Certification bodies will have to ensure that the local auditor knows when crops are typically grown and whether there is a significant change due to the intermediate cropping. Some flexibility should also be allowed to change the variety of the main crop, as this may be necessary to enable the farmer to fit in the intermediate crop.

    b. The option to calculate the impact on the yield of the main crop and apply that impact as a compensation factor on the amount of additional biomass that can be claimed is allowed in the Low ILUC-risk certification approach. However, yields show a large natural variation so this may lead to large variations in how much biomass could be claimed by a farmer each year, which does not necessarily reflect the impact of introducing intermediate crops.

    c. Land that would otherwise have been unproductive would usually mean that the land would have been fallow, although it could also include growing crops that are not harvested, for example catch crops for soil cover. We recommend that local auditors assess sowing and harvesting dates of the previous years at the farm-level and compare that to what is common in the region. This would be preferable to introducing for example, a reference date before which a farmer must prove that land was always bare at that time of year, as that would discriminate against farmers who already introduced cover cropping. Proving that the land would have been unproductive might be difficult if a farmer substantially changes their cropping rotation compared to previous practices to fit in the intermediate crop.

3. **Maintains soil quality**. Provision of soil benefits can distinguish intermediate crops that are grown for a “sustainable” purpose (e.g., cover crops) from an “unsustainable” intensification of the land. Ultimately, a farmer should be able to demonstrate that the soil quality is the same or ideally better after the intermediate crop, but there needs to be a practical way for a farmer to prove soil benefits at a farm level, avoiding costly on-farm measurements (note difficulties cited for farmers to implement the Esca methodology in practice). Scientific literature may be used to define plant types and

cultivation practices leading to soil health improvements, e.g. through symbiosis with fungi or via reduced tillage. The benefits should go beyond providing soil cover (as any crop grown on the land could claim that) and, to minimise administrative burden, any requirements on soil benefits should link to the extent possible to existing schemes or measurements that farmers are already required to take. For example, in the EU, either the upcoming EU Soil Health Strategy or the eco-schemes under the CAP.

a. Proposed amendments to Annex IX of REDII includes specifically that the soil organic matter content is maintained while growing an intermediate crop. However, regular soil sampling could be burdensome to the farmer (if similar to the Esca methodology).

b. Upcoming EU Soil Health Strategy aims to protect and restore the soil. It will define parameters for healthy soil, set up schemes for farmers to test their soil for free and aims to be in line with the CAP to promote sustainable soil practices

c. Strategic Plan Regulation of the CAP reforms outlines various possibilities Member States could include in their national list of the agricultural practices and eco-schemes (Article 31(4)). Improvement of soil fertility and of nutrient management is one of the examples to choose from

C.3 Low ILUC applicability and examples of challenges

The above criteria are applied to several of the trickier examples to conclude whether these should be considered to be intermediate crops, or not. The Commission should carefully **consider these examples when finalising the definition of intermediate crops.**

This Spanish pilot focused on severely degraded land. However, depending on any final definition of intermediate crops, this plot could be an example of intermediate cropping if the farmer can demonstrate that the camelina is grown during a period when the land would have been fallow. In this region, it is typical for farmers to have long fallow periods. It is typical for a farmer to have two years of growing a main crop and then to leave the land fallow for a year. In this case, growing a cover crop during this fallow period could be interpreted to be like a main crop as it would be the only crop grown on the land in a year. However, it would not “trigger demand for additional land” as the land would otherwise have been bare and this situation could therefore meet the definition of intermediate crop (REDII Article 2(40)). Intensive crop rotations (more than one crop per year) are not possible in this region due to the lack of rainfall in summertime. Note that, if this plot of land did meet the severely degraded land thresholds, it would highlight a case where the camelina could meet the definition of severely degraded land **and** intermediate crop and it is unclear how it would count in the proposed new Annex IX feedstocks. Clarifying how such case ought to be addressed is important because severely degraded land is proposed for addition to Part A, which is uncapped, whereas intermediate crops are proposed for addition to Part B which is capped. There is quite some potential overlap in the categories proposed, including that many of the crops suitable for intermediate cropping are also based on non-food cellulosic material which is also in Annex IX Part A.

Table 10 below outlines the previously discussed tricky example of the Spanish pilot and two other examples that came up during this project.

Table 10 Overview challenging examples intermediate crops and discussion points

Case	Crop	Problem context	Discussion points	Conclusion
Brazil	Safrinha maize and soy	• Some parts of Brazil have a multi cropping system of two harvest per year (safrinha maize and soy) • In the specific case of safrinha maize, it is already highly integrated in the world's grain market, so it would trigger demand for additional land if it were used for biofuel	• How to account for more than one main crop and multiple economically valuable components ? • Both crops are grown in favourable conditions i.e., "the best time of year"	• Two main crops are grown due to the good climatic conditions • As two main crops are grown, it is not in line with the proposed Annex IX definition of intermediate crop: *"…where due to a short vegetation period the production of food and feed crops is limited to one harvest"* • We do **not** recommend examples like this to be eligible as an intermediate crop
Spain	Camelina	• Some parts of Spain have a long fallow period (>1 year) due to climatic conditions • Camelina is grown during this fallow period and thus grown as the only crop on agricultural land in one year • This could make camelina the main crop as it is the only crop grown in a harvest year, but should it be considered that the "land would have been bare"?	• How to deal with examples as these, where fallow periods are >1 year? • What is the long-term impact of replacing fallow periods by an intermediate crop?	• An additional crop is grown in a regionally common fallow period • Technically this might not fit with the proposed definition in Annex IX of intermediate crop, as the additional crop would be the only crop grown in that year • However as it does not drive demand for additional land and does not displace a main crop, we recommend to broaden the Annex IX definition to include cases like this
Extending crop rotation	Cereals and oil crops (annual crops)	• Some regions have an already existing system of crop rotations • What if an extra crop is added to the crop rotation to extend the length of the crop rotation? E.g., wheat-barley-what-barley (2 year rotation) becomes wheat-barley-camelina-wheat-barley-camelina (3 year rotation) • What if there is a change in the crops grown in rotation so that a 4-5 month intermediate crop is grown when the land would have been bare for 3 months?	• How to account for changes in crop rotations to accommodate an additional crop?	• Crop rotation is extended, allowing for an additional crop type in the rotation, but this does not lead to additional biomass, as the original main crop is replaced by another main crop • This might therefore trigger demand for additional land • We do **not** recommend examples like this to be eligible as an intermediate crop

C.4 Conclusion

We recommend that the Commission provides clear and consistent definition and implementing guidance to determine intermediate crops in the context of being exempt from the food and feed cap and to be included in Annex IX, Part B. This can then be implemented through Commission-recognised voluntary schemes.

The definition proposed in Annex IX, Part B is an appropriate definition for intermediate crops. Furthermore we recommend:

- The criteria and guidance to define main crop and intermediate crop in Table 9 and the accompanying explanations can be used as a basis for implementing guidance to help voluntary schemes to implement the definition.

- Intermediate crops could use the low ILUC-risk methodology to calculate additional biomass and demonstrate that "their use does not trigger demand for additional land", especially in cases where the intermediate crop changes the existing crop rotation and thus impacts the yield of the main crop.

- Note, however that intermediate crops should not have to meet the additionality test required for low ILUC-risk certification as this is not an element of the food and feed crop definition.

- To further ensure that the definition is clear that intermediate crops are intended to mean crops grown when the land would have been unproductive, the definition should be clarified to take into account situations where land could be left fallow for a whole year, or longer. For example: "due to a short vegetation period the production of food and feed crops is limited to **a maximum of** one harvest **per year**"

- Intermediate crops should demonstrate that soil quality is maintained over time. Farmers should be allowed to demonstrate this in as practical a way as possible that also avoids unnecessary uncertainty from having to take ex-post on-farm measurements. The approach should align with other required farm measurements and forthcoming legislation such as the EU Soil Health Law

Appendix D. Examples of severely degraded land (short-list for phase 2 pilot selection)

This table lists a selection of examples of land that could potential class as severely degraded land for low ILUC-risk certification. The list served as a short-list for potential options for the phase 2 severely degraded land pilot.

Project name	Land status	Landscape type	Crop	Comments/ risks definition	Country	Land use before	Land use after	Goal/aim	Status
Noongar Land Enterprise (NLE) Group	Severely degraded land	Semi arid	Oil mallee	To restore the land, biomass needs to stay (no harvesting), thus not suitable for annual crops	Australia	Agriculture	Scrubland/mixed agriculture	Restoring land, increasing biodiversity by cool burning, Noongar practises (indigenous)	Interviewed but not shortlisted as the main aim of the project is to restore the land and not to increase biomass
Nimr	Severely degraded land	Desert	Cotton, Ricinus, Jojoba	Experimenting to use this technology for domestic waste water --> applicable in other regions with similar landscape	Oman	Desert	Agriculture	Wetlands to treat waste water from oil drilling	Interviewed and shortlisted for pilot. Not the final choice as it is niche and not in EU

Project name	Land status	Landscape type	Crop	Comments/ risks definition	Country	Land use before	Land use after	Goal/aim	Status
Camelina Company	Severely degraded land	Semi arid	Camelina	Interesting to test the soil conditions before and after harvesting camelina to see the effects of camelina on degraded land with long fallow periods. Would this meet the definition of degraded land?	Spain	Agriculture	Agriculture	Growing camelina without it affecting main crop yield/other crops	Phase 2 pilot
Pilot phase 1	Abandoned land	Grassland	Rapeseed / Blueberries	Would probably not pass the dLUC calculation threshold	Ukraine	Agriculture	Agriculture		Phase 1 pilot
Access to land	Abandoned land	Semi arid	Various organic crops	Would this meet the definition of abandoned land?	Spain	Agriculture	Agriculture	Reclaiming abandoned farmland for organic agriculture	(No response)
BioPlat EU	Abandoned land, Severely degraded land	Lignite mine (loose sand, low plant growth)	Sorghum, black locust	Would this meet the definition of degraded --> contaminated, not suitable for food/feed crops	Germany	Lignite mine	Agriculture	Growing biofuel crops on abandoned mine land	Not interviewed, would not be considered severely degraded as contamination is no longer included in the definition

Project name	Land status	Landscape type	Crop	Comments/ risks definition	Country	Land use before	Land use after	Goal/aim	Status
BioPlat EU	Abandoned land, Severely degraded land	Former sewage irrigation	Miscanthus, poplar, grass	Would this meet the definition of degraded --> contaminated, not suitable for food/feed crops	Germany	former sewage irrigation	Agriculture	Growing biofuel crops on land where food/feed crops cannot be grown	Not interviewed, would not be considered severely degraded as contamination is no longer included in the definition
Cres/ MAGIC	Abandoned land	Semi arid	Camelina	Abandoned land example that is in later stage than the phase 1 pilot	Greece	Agriculture	Agriculture	Reclaiming abandoned farmland to grow biofuel crops	(No response)

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