Agriculture Production Criteria

Climate Bonds Standard and Certification Scheme

Final Criteria Document

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NOTE: *These Criteria can be used to certify use-of-proceeds instruments, sustainability-linked debt instruments, assets, and entities as per the Climate Bonds Standard*

Document version	Release Date	Summary of Changes
Version 3[1]	October 2024	Updated Criteria for Use of Proceeds and Asset Certification based on current science. Addition of Criteria and transition pathways for Sustainability-Linked Debt and Entity Certification
Version 2	June 2021	Addition of livestock Criteria Restructured to improve usability
Version 1	August 2020	Initial publication with Criteria for crops

[1] Updated 6th November 2024

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1 Introduction

1.1 The Climate Bonds Standard

Investor demand for climate bonds is strong and is expected to increase in line with the delivery of quality products into the market. Sustainable debt issuance as of end of year 2023 was in the order of USD5.5tn and continues on an upward trajectory with ongoing diversification in the types of debt issued. To support this growth, standards, assurance, and certification are essential to demonstrate credibility, which improves confidence and transparency.

The Climate Bonds Standard and Certification Scheme is an easy-to-use screening tool that provides a clear signal to investors and intermediaries on the climate integrity of Certified Climate Bonds.

At the core of the Standard is a suite of sector-specific eligibility Criteria, each of which sets climate change benchmarks for that sector. These are used to screen debt instruments, assets and/or entities, so that only those with climate integrity, either through their contribution to climate mitigation, and/or to adaptation and resilience to climate change, will be Certified.

These sector-specific Criteria are determined through a multi-stakeholder engagement process, including a technical working group (TWG) and an industrial working group (IWG), convened and managed by Climate Bonds, which are subject to public consultation. Finally, they are reviewed and approved by the Climate Bonds Standard Board (CBSB).

The Climate Bonds Standard and Certification Scheme is supported by the overarching Climate Bonds Standard which sets out the cross-sectoral as well as sector-specific Criteria all Certified instruments, assets, and entities must meet.

1.2 Environmental scope of the Agriculture Production Criteria

Currently, Certification requirements address:

- climate change mitigation;
- climate change adaptation; and
- other environmental and social safeguards.

1.3 What can be Certified under the Agriculture Production Criteria

The following can be Certified under these Criteria following the update of the overarching Climate Bonds Standard:

1. Assets and use-of-proceeds (UoP) bonds financing climate mitigation measures (Section 3.2; e.g., investments aiming to reduce direct farming emissions, and support soil carbon sequestration), climate adaptation measures (Section 3.3; e.g., climate forecasting, flood risk reduction) and supporting activities enabling mitigation and adaptation (Section 3.4; e.g. GHG assessments, satellite monitoring).
2. Entities (Agrifood farming companies) and sustainability-linked debt (SLD) issued by those entities under Section 4.

The Climate Bonds Standard **(CBS)** provides any cross-sectoral requirements for UoP Certification, Asset Certification, Entity Certification or SLD Certification which must be met in addition to the agriculture production-specific requirements described in this document.

Applicants to the CBS must provide information to demonstrate compliance with the Criteria, which is validated by third-party Climate Bonds approved verifiers in the assurance process.

1.4 Documents supporting the Criteria

Specific information to support applicants and verifiers is available at Agriculture Production Climate Bonds Initiative as follows:

- *Agriculture Production Background Paper* detailing how the Criteria were chosen;
- *Agriculture Production Frequently Asked Questions* (FAQs);
- *Agriculture Production Criteria Public Consultation Feedback and Responses Summary.*

In addition, the following cross-cutting information to support applicants and verifiers is available as follows:

- The Climate Bonds Standard contains the requirements of the overarching CBS;
- The Climate Bonds Standard v4.2 Entity and Sustainability-Linked Debt Checklist documents provide further information on the cross-sectoral requirements for Entity and SLD Certification, respectively.

For more information on Climate Bonds and the Climate Bonds Standard and Certification Scheme, see www.climatebonds.net.

1.5 Revisions to the Criteria

These Criteria will be reviewed by the TWG on a regular basis, considering the issuances in the early stages, and any developments in improved methodologies and data that can increase the climate integrity of future issuances. As a result, the Criteria are likely to be refined over time, as more information becomes available. Certification will not be withdrawn retroactively from bonds Certified under earlier versions of the Criteria.

1.6 Acknowledgements

Climate Bonds gratefully acknowledges the technical working group (TWG) and industry working group (IWG) members who provided their time and expertise during the development of these Criteria. The full list of members is provided in Appendix 5.

Special thanks are given to ***Reyes Tirado***, Global Agrifood Lead at Climate Bonds and technical lead for these Criteria, ***Ewan Thomson*** and ***Chrys Pablo***, for coordinating the development of the Criteria through the TWG, and ***Joseph Poore***, Lead Consultant, HESTIA Project, University of Oxford, for supporting the development of the Criteria.

The development of the Agriculture Production Criteria was made possible through the generous support of the Gordon and Betty Moore Foundation.

2 Agriculture production activities in scope

The global food system accounts for 21–37% of total global greenhouse gas emissions making it a major contributor to climate change.[2]

The agriculture production stage of the supply chain is the largest contributor to food emissions, mostly as N_2O and CH_4 emissions from crop and livestock production, and CO_2 emissions from land use/land-use change activities and manufacturing inputs. The mitigation of these emissions, representing 13-21% of global emissions (according to the IPCC AR6), is the focus of these Criteria.

Remaining food system emissions arise from post-farm supply chain activities: retail, transport, consumption, waste management, industrial processes, and packaging. These will be the subject of the future Climate Bonds Food Value Chain Criteria to be available in 2025.

The transformation of agriculture production over the coming decades is essential to keeping global warming as close as possible to the 1.5°C target.[3] Transition pathways to 1.5°C across sectors require that agricultural practices fulfil two main mitigation elements:

- A reduction in emissions of N_2O and CH_4 gases (with a significant effect on short-term warming dynamics).
- Sequester carbon from the atmosphere into agricultural soils and biomass.[4]

These two elements are essential for the food system transition towards 1.5°C-aligned emissions trajectories, and one cannot substitute the other. Furthermore, it is essential that the sector applies adaptation measures to ensure the long-term integrity of food production for human wellbeing.

2.1 Agriculture production in scope

These Criteria apply to eligible agrifood production assets and entities, and associated financial instruments: use of proceeds (UoP) and sustainability-linked debt (SLD).

The Criteria cover the agriculture production stage of the food value chain (Figure 1). The rest of the food value chain will be covered by additional future sector Criteria: Food Value Chain and Alternative Proteins.

These Criteria are for agriculture production entities (and their debt), i.e., farms composed of one or more production units, involved in the production of crops grown for human food, animal feed, and livestock products.

Agriculture production activities in scope:

- All perennial and non-perennial crop production potentially grown for human food, animal feed, and livestock is included (e.g., alfalfa, oil palm, and soy). Agroforestry production systems where food crops and animals take up more than 50% of the land area are included.[5]
- Livestock production of all terrestrial livestock animals is included, as are milk and eggs. (For entities and SLD, aquaculture production is also included, but not for assets and UoP.)

Agriculture production activities out of scope:

- Crops grown exclusively for non-food uses. Exclusions are therefore textile crops, crops used for construction (e.g., bamboo), rubber, tobacco, bioenergy crops with only non-food uses (e.g., miscanthus), and pharmaceutical crops.
- Non-food animal products such as leather and wool.

Some non-food crops that are grown as part of a mostly agrifood system could be eligible, if their characteristics can be assimilated to agrifood crops. Such crops could be for example cotton or jute when intercropped or rotated with agrifood crops. Bioenergy crops cannot be part of this exception (please refer to the Climate Bonds Bioenergy Criteria for more information).

Controlled environment agriculture such as greenhouse or hydroponic production are considered in scope for Entity and SLD Certification (see Section 4). However, they are out of the scope for Asset and UoP Certification due to the special considerations

2 Intergovernmental Panel on Climate Change (IPCC), 2019: Summary for Policymakers. In: Climate Change and Land: an IPCC special report on climate change, desertification, land degradation, sustainable land management, food security, and greenhouse gas fluxes in terrestrial ecosystems [P.R. Shukla, J. Skea, E. Calvo Buendia, V. Masson-Delmotte, H.- O. Pörtner, D. C. Roberts, P. Zhai, R. Slade, S. Connors, R. van Diemen, M. Ferrat, E. Haughey, S. Luz, S. Neogi, M. Pathak, J. Petzold, J. Portugal Pereira, P. Vyas, E. Huntley, K. Kissick, M. Belkacemi, J. Malley, (eds.)].

3 Intergovernmental Panel on Climate Change (IPCC), (2023) 'Agriculture, Forestry and Other Land Uses (AFOLU)', in Climate Change 2022 - Mitigation of Climate Change. 1st ed. Cambridge University Press, pp. 747–860. Available at: https://doi.org/10.1017/9781009157926.009.

4 Clark, M.A. et al. (2020) 'Global food system emissions could preclude achieving the 1.5° and 2°C climate change targets', Science, 370(6517), pp. 705–708. Available at: https://doi.org/10.1126/science.aba7357.

5 Agroforestry is defined by the FAO as land use systems and technologies where woody perennials (trees, shrubs, palms, bamboos etc) are deliberately used on the same land management units as agricultural crops and/or animals, in some form of spatial arrangement or temporal sequence. See www.fao.org/forestry/agroforestry/80338/en.

associated with their infrastructure and energy use. These are covered in the Criteria for protected agriculture (currently only available for a single country: Mexico).

The Criteria for assets and UoP also cover activities undertaken outside of specific agricultural production units that support mitigation and adaptation measures in farms, but which do not necessarily take place in agriculture production units (Section 3).

The mandate from the Climate Bonds Standard principles is to align with global standards, such as AFi and SBTi as far as possible, and this is reflected in these Criteria, which are applicable globally. However, the issue of regional contextualisation is an unavoidable gap currently due to insufficient climate pathways and regionalised data at the scale required, which should be a key improvement to pursue in the next iteration of the Criteria.

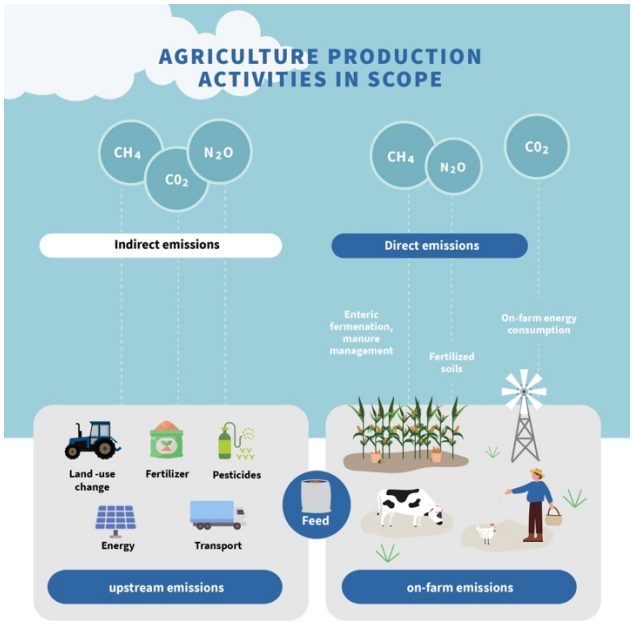

Figure 1. Representation of main agriculture production activities and major emissions covered in the current Criteria: including on-farm and upstream activities and emissions, up to the farm gate. Source: modified from FAO[6]

2.2 The boundary of the production unit

The boundary of the eligible crop and livestock production system is, in essence, 'farmgate to farmgate', which can include non-contiguous lands and production systems (for example, for livestock this can include feed-processing facilities, such as a soy oil facility which creates soy meal as the co-product).

The farm is treated as the production unit and includes other areas linked to the agricultural production system by ownership, lease or function. Buffer zones, conservation set-asides, and grassland are part of the agriculture production unit if they constitute part of the land property of the farm production unit and are not used as offsets for other GHG emissions sources.

Non-contiguous production activities are eligible if they are related to farm production prior to the sale of the product (such as storage, manure management, or composting) and managed by the production unit.

Applicants are expected to define the land boundaries of the production unit as 'working lands' and according to the scope of the Certification application.

Eligible assets and projects include those integral to the whole production unit (such as land purchase costs for an entire farm) or only a part of the production unit (such as equipment or infrastructure for eligible measures or the purchase of additional land for expansion of the farm) in addition to related and supporting expenditures, as defined by the Climate Bonds Standard.

2.3 Alignment with other Sector Criteria

Climate Bonds has developed Sector Criteria with links to the agrifood system, the most relevant of which are summarised in Table 1.

[6] https://www.fao.org/3/cc9029en/cc9029en.pdf

Table 1. Assets or projects partially or wholly covered by other Sector Criteria.

Section of the agrifood chain	Covered by other Sector Criteria	Climate Bonds Criteria
Land-use chain: deforestation and conversion of natural ecosystems	Only for entities in the food value chain beyond the farm, and only to cover the land-use change element of their decarbonisation strategies.	Agrifood Deforestation and Conversion Free Criteria
Waste	Waste management (includes composting and anaerobic digestion).	Waste Management Criteria
Water infrastructure	Water infrastructure assets and/or projects.	Water Infrastructure Criteria
Low-carbon fuels	Hydrogen, ammonia, and biomass for electricity production.	Hydrogen, Waste management, and Bioenergy Criteria
Renewable electricity generation facilities	Solar, wind, marine, hydropower, geothermal, and bioenergy.	Solar, Wind, Geothermal, Hydropower, Bioenergy and Marine Criteria
Electrical utilities	Electrical utility entities (electricity generation segment).	Electrical Utility Criteria

Source: Climate Bonds

3 Eligibility Criteria for Use of Proceeds and Asset Certification

These Criteria cover UoP bonds and Asset Certification for projects and/or assets focussed on achieving one or more significant climate outcomes in agriculture production units ('working lands'): 1) climate emissions savings, 2) carbon removal, and/or 3) adaptation to climate risks at the farm level. In addition, these Criteria also cover 4) supporting activities or measures that aim at *enabling* the climate mitigation or adaptation of the production unit, even if those activities take place *outside* production units. These climate objectives represent the four routes for Certification from which eligible measures can be selected in specific projects, practices, and/or assets (Figure 2).

Eligible measures from these different routes for Certification can be combined by nominated projects and/or assets applying for Certification. For example, an applicant might choose to issue UoP debt for a project focusing on measures for reducing GHG emissions (Table 4) and/or measures focusing on carbon sequestration (Table 6), and/or measures on adaptation (Table 8) and/or supporting activities (Table 9).

Equally, another applicant might choose to certify an asset (including whole production unit(s)) associated with one or more routes for Certification from the categories outlined in Figure 2, for example certifying an asset (production unit(s) for eligible measures to reduce emissions (Table 5) and to sequester carbon (Table 6).

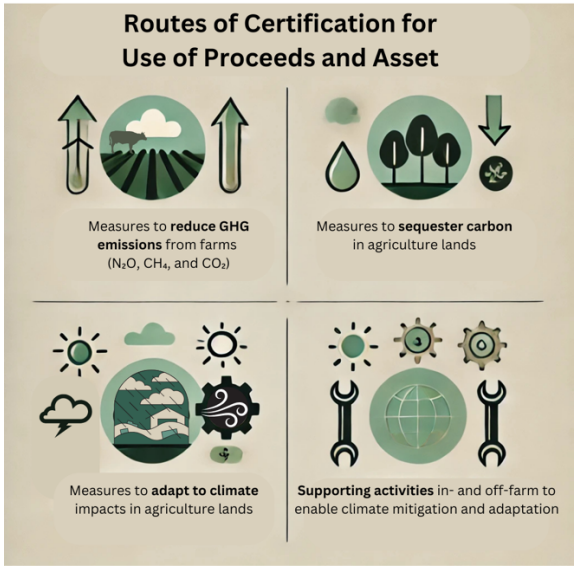

Figure 2. Routes for Certification (climate objectives) for Use of Proceeds and Asset Certification

The process to check eligibility for Certification involves a four-step rationale (explained in detail in the sections below, see Figure 3).

1. **Deforestation- and conversion-free (DCF) precondition for the applicant's land production units (working lands).** The land associated with the Certification application (i.e., project, asset, or portfolio of assets or measures) must demonstrate deforestation- and conversion-free status since 31 December 2010 (cut-off date of 2010 as in previous Climate Bonds Agriculture Criteria (2021) (see Table 3).
2. **Select the route(s) for Certification from the main categories of climate objectives**:
    a. Reducing GHG emissions from farm practice and/or operations in agriculture production units (see eligible measures in Table 4 for UoP and Table 5 for Asset Certification).
    b. Sequestering carbon in the relevant agriculture production units (see eligible measures in Table 6).
    c. Adapting to climate change in the agriculture production units (see eligible measures in Table 8).
    d. Supporting activities (in- or off-farm) enabling climate mitigation and/or adaptation of agriculture production in scope (see eligible measures in Table 9).

3. **Check the climate adaptation safeguard**. The applicant must demonstrate that the eligible measures minimise impacts from climate risks by undertaking the process outlined in the risk assessment and risk mitigation checklist (see Section 5.1 and Table 14).
4. **Check other environmental and social safeguards (Section 5):**
    a. Biodiversity (Section 5.2);
    b. Water (Section 5.3);
    c. Social (Section 5.4); and
    d. Animal welfare (Section 5.5) (if applicable).

3.1.1 Qualitative proxies that can be used for UoP or Asset Certification

Based on current scientific consensus and to allow for an easier Certification route for those applicants already engaged in low-carbon and environmentally beneficial practices and/or in vulnerable contexts, a small set of proxies can be used instead of the quantifiable Criteria for the four routes for UoP and Asset Certification. These proxies can be used for automatic eligibility for a limited time until 2030.[7] The DCF precondition and the climate adaptation, environmental and social safeguards still apply.

Table 2. Qualitative proxies that can be used for automatic UoP or Asset Certification.

Proxy for UoP or Asset Certification	Demonstration of compliance
Organic farming (certified, plant-based or mixed production system).	• Third party certification for organic agriculture under IFOAM or equivalent certification scheme. • Should apply to 90% of the applicant's production unit(s). • Not applicable to intensive livestock production operations and factory farms, following definitions from EU Industrial Emissions Directive.[8] • Should include a commitment to full GHG accounting by 2030.
Agroecology principles and practices (plant-based or mixed production system) applied in production unit(s).	• Following definition from CGIAR HOLPA framework.[9] • Should apply to 90% of the entity's production unit(s). • Not applicable to intensive livestock production operations and factory farms, following definitions from EU Industrial Emissions Directive.[10] • Should include a commitment to full GHG accounting by 2030.

[7] IPCC 2023. Organic Agriculture> IPCC AR6 Chapter 7, p. 798 Agroecology> IPCC AR6 Chapter 7, p. 798 improved productivity for small-scale producers> IPCC AR6 Chapter 7, p. 795

[8] Pig farms with more than 350 livestock units (LSU) (equivalent to approximately 1100 adult pigs and 700 sows), poultry farms with laying hens with more than 300 LSU and broilers with more than 280 LSU (equivalent to approximately 40000 chickens for meat, and 21400 laying hens). For farms rearing both pigs and poultry the limit will be 380 LSU. https://www.europarl.europa.eu/news/en/press-room/20240308IPR19007/reducing-pollution-from-industry-and-large-livestock-farms For LSU conversions see: https://ec.europa.eu/eurostat/statistics-explained/index.php?title=Glossary:Livestock_unit_(LSU)
For bovine cattle, the limit will be for farms with more than 150 LSU, as originally proposed by the Commission. https://www.europarl.europa.eu/news/en/press-room/20231127IPR15436/pollution-deal-with-council-to-reduce-industrial-emissions.

[9] https://www.cgiar.org/news-events/news/the-measure-of-agroecology

[10] Pig farms with more than 350 livestock units (LSU) (equivalent to approximately 1100 adult pigs and 700 sows), poultry farms with laying hens with more than 300 LSU and broilers with more than 280 LSU (equivalent to approximately 40000 chickens for meat, and 21400 laying hens). For farms rearing both pigs and poultry the limit will be 380 LSU. https://www.europarl.europa.eu/news/en/press-room/20240308IPR19007/reducing-pollution-from-industry-and-large-livestock-farms For LSU conversions see: https://ec.europa.eu/eurostat/statistics-explained/index.php?title=Glossary:Livestock_unit_(LSU)
For bovine cattle, the limit will be for farms with more than 150 LSU, as originally proposed by the Commission. https://www.europarl.europa.eu/news/en/press-room/20231127IPR15436/pollution-deal-with-council-to-reduce-industrial-emissions.

Proxy for UoP or Asset Certification	Demonstration of compliance
Improved production systems for vulnerable contexts to increase productivity and efficiency sustainably (i.e., for small-scale producers including investments for capacity building in climate mitigation practices).	• Should apply to 90% of the entity's production unit(s). • Not applicable to intensive livestock production operations and factory farms, following definitions from EU Industrial Emissions Directive.[11] • Should include a commitment to full GHG accounting by 2030.Vulnerable context defined as meeting these three elements: 1) Located in a low-income country, defined by World Bank standards, or falls below the World Bank poverty line based on the average expected annual value of yields sold from the farm. 2) Agricultural products are used only for domestic consumption in the country and not exported. 3) The issuer demonstrates that mitigation options were reviewed and provides a justification as to why the constraints to meeting and/or demonstrating the requirements could not be overcome.

3.2 Eligible types of expenditure for UoP debt instruments

Eligible expenditure includes the following:

- Related and supporting expenditure for projects or physical assets, where the projects or physical assets related to the measures meet the relevant eligibility Criteria (such as the Criteria in Section 3);
- Capital expenditure undertaken to increase the value and/or lifetime of the assets or projects linked to the eligible measures;
- Related and supporting expenditure including relevant installation and routine maintenance expenditure and upgrades undertaken to maintain the value and/or lifetime of the assets or projects linked to the eligible measures.

In line with this, eligible debt instruments relating to agriculture production systems might include capital and operating expenditure relating to, for example: (1) inputs (e.g., seeds, fertilisers, energy), (2) capital goods (e.g., farmland, equipment, housing, storage), (3) crop-based transformation processes (e.g., crop cultivation, planted trees), (4) waste management on the production unit (composting, manure, crop residue processing, recycling), and (6) primary processing and storage before point of sale.

Eligible uses of proceeds relating to supporting activities generated outside of the production system that enable mitigation or climate adaptation on production systems can include a variety of capital and operating expenditure associated with the provision of the eligible product or service.

For the avoidance of doubt, what will not be considered eligible are activities, assets, or projects where the climate benefits are unclear or have an unclear time horizon, for example:

- Research and development programmes where climate benefits are unclear based on current science.
- Biodiversity projects with unclear climate benefits.
- General behavioural-change training with unclear climate objectives.
- Any project with an unclear time horizon for climate benefits.
- Expenditure relating to general corporate purposes.

[11] Pig farms with more than 350 livestock units (LSU) (equivalent to approximately 1100 adult pigs and 700 sows), poultry farms with laying hens with more than 300 LSU and broilers with more than 280 LSU (equivalent to approximately 40000 chickens for meat, and 21400 laying hens). For farms rearing both pigs and poultry the limit will be 380 LSU. https://www.europarl.europa.eu/news/en/press-room/20240308IPR19007/reducing-pollution-from-industry-and-large-livestock-farms For LSU conversions see: https://ec.europa.eu/eurostat/statistics-explained/index.php?title=Glossary:Livestock_unit_(LSU)
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https://www.europarl.europa.eu/news/en/press-room/20231127IPR15436/pollution-deal-with-council-to-reduce-industrial-emissions.

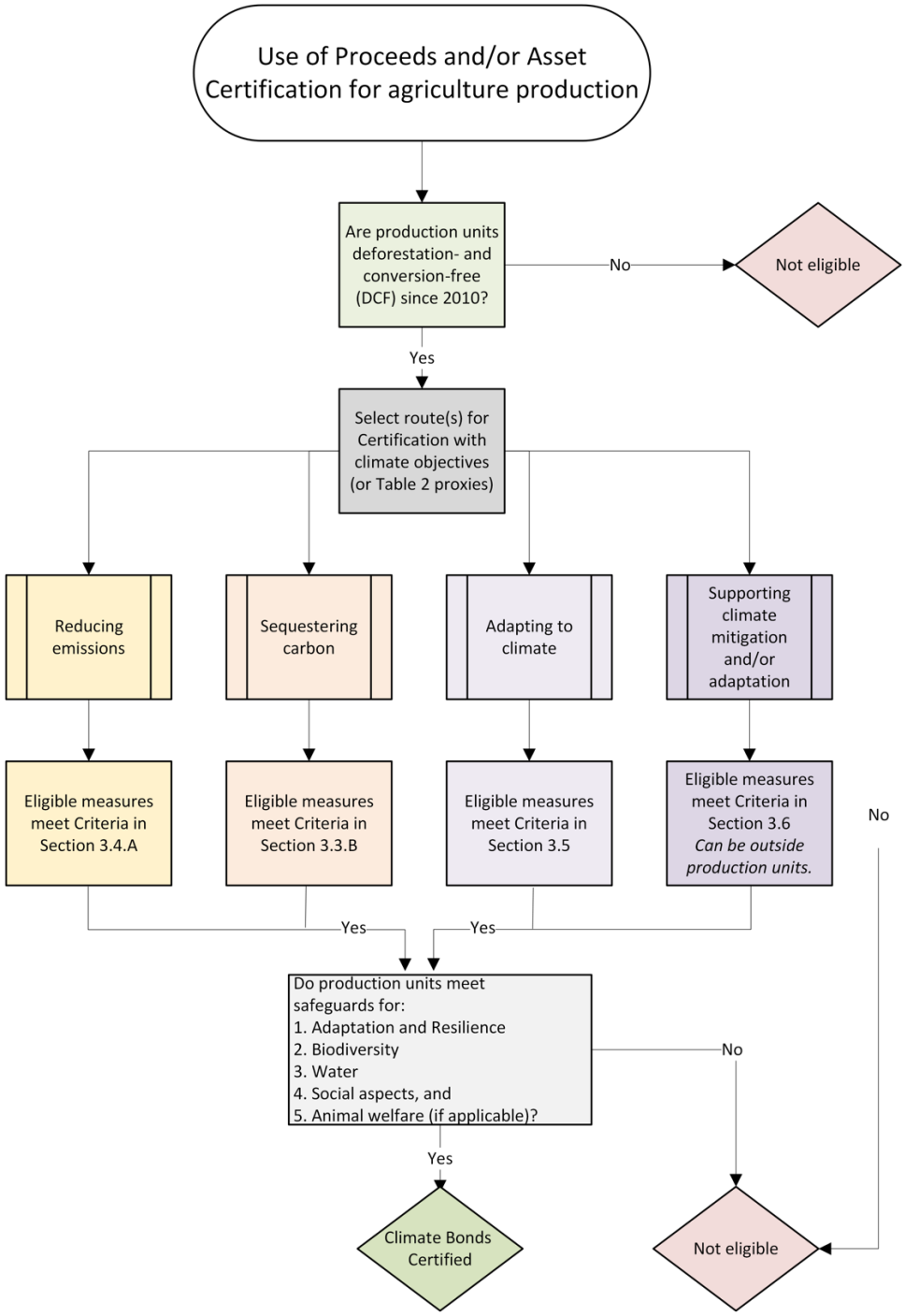

Figure 3. Flowchart of the Criteria for Use of Proceeds (UoP) and Asset Certification explaining the decision process involved in checking eligibility for Certification.

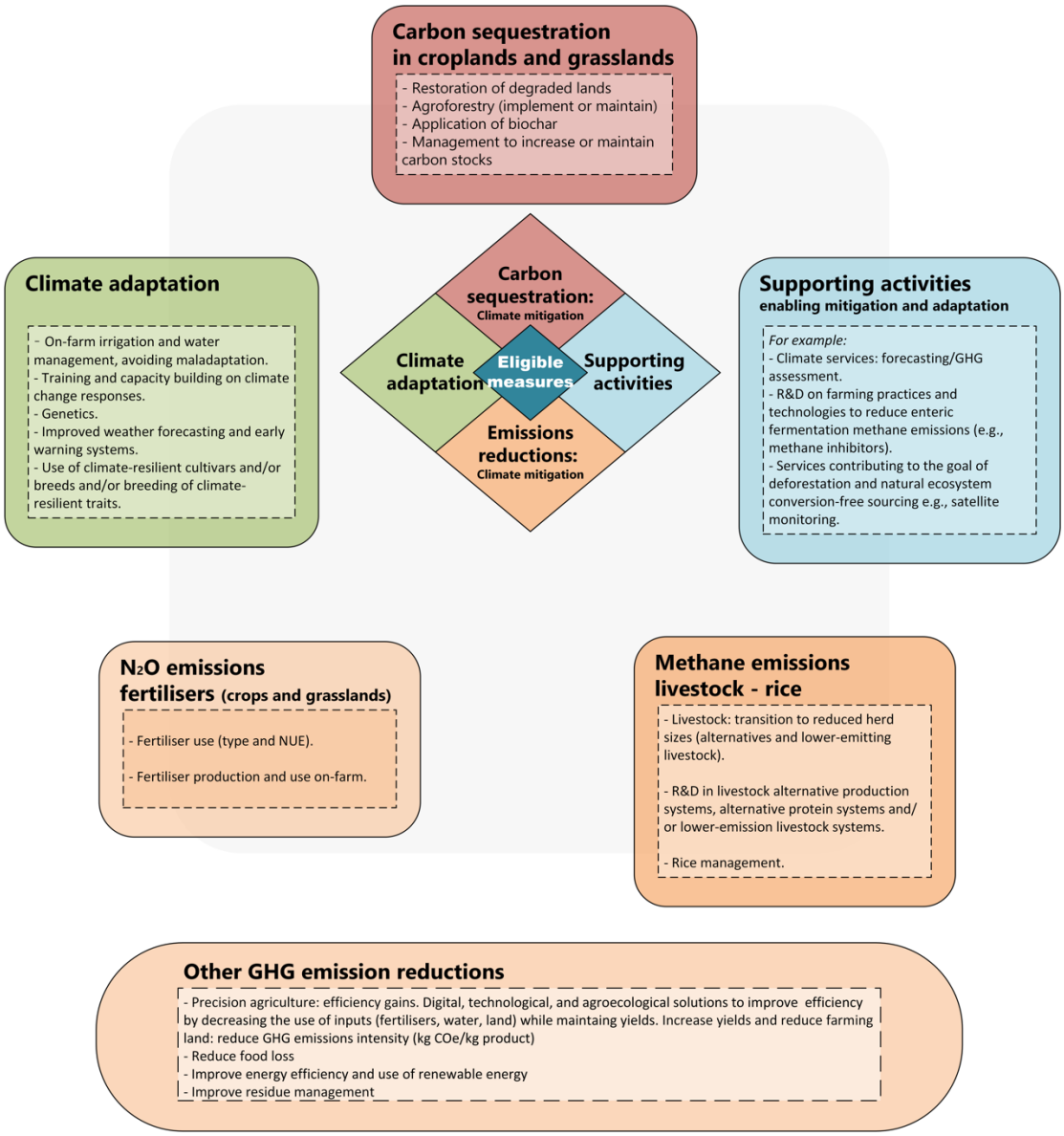

Figure 4. Eligible measures for UoP and Asset Certification under the Climate Bonds Agriculture Criteria (see Tables for full details on practices and metrics for demonstration of compliance). Deforestation- and conversion-free land status applies to all production units where eligible measures are applied (Table 3).

3.3 Precondition: deforestation- and conversion-free agriculture production systems

This requirement acts as a precondition for UoP and/or Asset Certification of any agricultural land production units (working lands) linked to the application.

Table 3. UoP and Asset: precondition eligibility requirement for land use and land-use change.

Precondition: deforestation- and conversion-free agriculture production system		
Requirement	**Demonstration of compliance**	
Farmland that is part of the production unit or units is free from deforestation and conversion of natural ecosystems since 31 Dec **2010**	Geolocation of production units (polygon for units > 4 ha and single point for units < 4 ha).	To be verified compared to production unit land-use status before 31 Dec **2010**

3.4 Measures eligible for climate mitigation of emissions on farms (agriculture production units)

Measures eligible for climate mitigation of agriculture production fall under two routes for Certification (climate objectives):

A) Reducing absolute emissions (N_2O, CH_4, and CO_2) from farm practices and operations in agriculture production units;

B) Sequestering carbon in agriculture production units.

Both categories have equal importance, and applicants are encouraged to select a portfolio of eligible measures aiming both at reducing emissions and at increasing carbon in agricultural lands simultaneously.

As mentioned, in addition to climate mitigation, investments in agriculture production units might also include eligible measures under adaptation to climate change (Section 3.5) and/or supporting activities (in- or off-farm) which enable climate mitigation and/or adaptation measures in scope (Section 3.6). Figure 4 summarises the main eligible measure for UoPs and assets under the four routes for Certification.

A. Measures for reducing absolute greenhouse gas (GHG) emissions (N_2O, CH_4, and CO_2)

Eligibility requirements for Use of Proceeds Certification

Based on current science, eligible measures for UoP Certification aiming at reducing GHG emissions are presented in Table 4, including details on the specific requirements for demonstration of compliance.

These eligible measures must be linked to the nominated projects and/or assets to be associated with the certifiable UoP debt instrument. UoP Certification is valid for the term of the instrument if the requirements under Standards v.4 and these Criteria are met.

For livestock, one specific exclusion applicable to any UoP application relates to intensive livestock operations and factory farms, following definitions in the EU Industrial Emissions Directive.[12]

Table 4. UoP Certification: Eligible measures for reducing absolute emissions (N_2O, CH_4 and CO_2).

Route for Certification	Eligible measure	Demonstration of compliance

[12] Pig farms with more than 350 livestock units (LSU) (equivalent to approximately 1100 adult pigs and 700 sows), poultry farms with laying hens with more than 300 LSU and broilers with more than 280 LSU (equivalent to approximately 40000 chickens for meat, and 21400 laying hens). For farms rearing both pigs and poultry the limit will be 380 LSU. https://www.europarl.europa.eu/news/en/press-room/20240308IPR19007/reducing-pollution-from-industry-and-large-livestock-farms For LSU conversions see: https://ec.europa.eu/eurostat/statistics-explained/index.php?title=Glossary:Livestock_unit_(LSU)
For bovine cattle, the limit will be for confined animal feeding operation, or enclosed cattle in farms with more than 150 LSU, as originally proposed by the Commission. https://www.europarl.europa.eu/news/en/press-room/20231127IPR15436/pollution-deal-with-council-to-reduce-industrial-emissions.

3.1. Reduction of N_2O emissions from N fertiliser use in crops (perennial and non-perennial, including pastures).	**Substituting fossil fuel-based N fertiliser with organic or zero-emissions N fertilisers while maintaining/increasing nitrogen use efficiency (NUE). For new production units: applying organic or zero-emissions N fertilisers while maintaining/increasing NUE.** Examples of eligible N inputs: - Biological N-fixation as the source of nitrogen inputs (e.g., cover crops for green manuring, etc.); - Green ammonia;[13] - Commercial organic N fertilisers.[14] Example of eligible practices to increase NUE: - Site-specific nutrient management (SSNM).[15] Not eligible: substitution based on fertilising with manure from intensive livestock operations and factory farms, following definitions from the EU Industrial Emissions Directive.[16]	A nutrient management plan is in place with evidence of the following: 1) Minimum 50% share of zero-emissions or organic fertilisers (achieved during the period of the UoP issuance), AND 2) Projected significant increase or maintenance of minimum 75% NUE[17] (kg of yield/kg of N applied) in line with optimum values of N application rates (should include temporal datasets on N inputs and yields). OR 3) Measurable reduction of N_2O emissions relative to its baseline of at least 1.5% per year (measured following GHG Protocol guidance).[18] OR *A proxy for this measure can also be a certification or conversion plan for the production unit to certified organic agriculture (IFOAM).*
3.2. Organic fertiliser production and use in crops (perennial and non-perennial, including pastures) and livestock production units, to	**On-farm organic fertiliser production and use, including composting/biochar from farm residues (including vermi-composting).** Not eligible: fertilising with manure from intensive livestock operations and factory farms, following definitions from EU Industrial Emissions Directive.[19]	A farm management plan which evidences the significance of the measure to reduce emissions, including the following: 1) Volume of on-farm organic fertiliser or compost/biochar produced, AND 2) Sustainability of source and volume of farm residues utilised, AND 3) Intended use of the organic fertiliser production,

[13] Zero carbon ammonia, called 'green ammonia', uses renewable energy to power electrolysis to produce hydrogen from water (replacing the steam methane reforming process based on hydrocarbon feedstocks) and the subsequent ammonia synthesis. Ammonia production is covered under the Climate Bonds Basic Chemicals Criteria available at https://www.climatebonds.net/standard/available

[14] https://www.sciencedirect.com/science/article/abs/pii/S0048969722052317

[15] See Section 6.4 in Mukherji, A., Marshall S., Arango, J., Costa Jr, C., Flintan, F., Hebebrand, C., Kihara, J., Masso, C., Molloy, P., Rusinamhodzi, L., Sapkota, T., Vanlauwe, B. (2024). 2024 Breakthrough Agenda Report: Agriculture, CGIAR, Montpellier, France. https://hdl.handle.net/10568/152247; pp: 44

[16] Pig farms with more than 350 livestock units (LSU) (equivalent to approximately 1100 adult pigs and 700 sows), poultry farms with laying hens with more than 300 LSU and broilers with more than 280 LSU (equivalent to approximately 40000 chickens for meat, and 21400 laying hens). For farms rearing both pigs and poultry the limit will be 380 LSU. https://www.europarl.europa.eu/news/en/press-room/20240308IPR19007/reducing-pollution-from-industry-and-large-livestock-farms For LSU conversions see: https://ec.europa.eu/eurostat/statistics-explained/index.php?title=Glossary:Livestock_unit_(LSU)
For bovine cattle, the limit will be for farms with more than 150 LSU, as originally proposed by the Commission.
https://www.europarl.europa.eu/news/en/press-room/20231127IPR15436/pollution-deal-with-council-to-reduce-industrial-emissions.

[17] Breakthrough report page recommendation A.2 https://agriculture-breakthrough2024.cgiar.org/section-7-recommendations-for-international-collaborative-action

[18] This is based on the previous Climate Bonds Criteria that had a yearly 2% GHG reduction 2020-2030 and 1.5% reduction 2030-2050 (in-line in EU Taxonomy TEG recommendation).

[19] Pig farms with more than 350 livestock units (LSU) (equivalent to approximately 1100 adult pigs and 700 sows), poultry farms with laying hens with more than 300 LSU and broilers with more than 280 LSU (equivalent to approximately 40000 chickens for meat, and 21400 laying hens). For farms rearing both pigs and poultry the limit will be 380 LSU. https://www.europarl.europa.eu/news/en/press-room/20240308IPR19007/reducing-pollution-from-industry-and-large-livestock-farms For LSU conversions see: https://ec.europa.eu/eurostat/statistics-explained/index.php?title=Glossary:Livestock_unit_(LSU)
For bovine cattle, the limit will be for farms with more than 150 LSU, as originally proposed by the Commission.
https://www.europarl.europa.eu/news/en/press-room/20231127IPR15436/pollution-deal-with-council-to-reduce-industrial-emissions.

reduce N_2O, CH_4, and/or CO_2 emissions.		OR 4) Measurable reduction of GHG emissions relative to a baseline of at least 1.5%[20] per year (measured following GHG Protocol guidance).
3.3. Improved flooded rice systems to reduce methane (CH_4) emissions in rice cropping systems.	**Improved rice production through effective water management and residue straw management by implementing practices aimed at reducing days of flooding by at least 10%.**	A rice production management plan that demonstrates a reduction in days of flooding by at least 10% by outlining one or more of the eligible practices:[21] • Shallow flooding: utilising shallow water levels to optimise growth. • Direct-seeded rice: planting rice directly in the field for improved establishment. • Short-duration, high-yielding varieties: selecting varieties that mature quickly while maximising yield. • Midseason drying events: allowing the field to dry midway through the growing season to enhance soil health. • Alternate wet and dry techniques: alternating between wet and dry conditions to conserve water and improve rice quality. AND • Off-Season straw management: properly managing straw during the off-season to benefit soil health. OR Measurable reduction of CH_4 emissions relative to a baseline of at least 1.5% per year (measured following GHG Protocol guidance).[22]
3.4 Transform livestock systems to lower CH_4 emissions in livestock systems.	**Transition farm income towards reduced herd size**.[23] Reducing herd sizes by at least 50% in large operations can lower methane emissions, while supporting carbon sequestration efforts through improved grazing practices. Investments in alternative proteins (e.g., plant-based or cultured meats) and lower-emission livestock systems can provide economic	A farm management plan which evidences the significance of the measure to reduce herd sizes, including the following: 1) Reduced livestock operation to be at least 50% of LSU for the period of the issuance with potential substitutions in other production systems with lower GHG footprint (i.e., plant-based protein

[20] This target value is based on the previous Climate Bonds Criteria that had a yearly 2% GHG reduction 2020-2030 and 1.5% reduction 2030-2050 (in-line in EU Taxonomy TEG recommendation).
[21] EU Taxonomy Technical Annex, p. 131
[22] This target value is based on the previous Climate Bonds Criteria that had a yearly 2% GHG reduction 2020-2030 and 1.5% reduction 2030-2050 (in-line in EU Taxonomy TEG recommendation).
[23] As suggested under EU Taxonomy technical annex, p. 108

	opportunities for farmers while contributing to global food security.	production), while supporting farm income;[24] AND 2) Measurable reduction of CH_4 emissions relative to a baseline of at least 1.5% per year (measured following GHG Protocol guidance).[25] Note: Climate Bonds Alternative Protein Criteria will be available in early 2025.
3.5. R&D on alternatives to substitute or downsize livestock systems to reduce CH_4 emissions in livestock systems.	**R&D of meat and dairy alternatives to substitute or downsize livestock production systems.[26]**	Investment plan for R&D in production unit(s) seeking alternatives for reducing herd sizes, e.g. alternative production systems, alternative protein systems and/or lower-emission livestock systems.[27] Check eligible research and development expenditure details under the latest Standard v.4.
3.6 Harvest, post-harvest, and storage to reduce food loss to reduce GHGs in Crops (perennial and non-perennial) and livestock systems.	**Optimise harvest, post-harvest, and/or storage facilities before the point of sale to avoid production-level food loss.**	Improved harvest, post-harvest, and/or storage must aim at achieving a level of food loss no higher than 10% of total food production from post-harvest to distribution, except for cereals and grains which should aim towards less than 5% food loss).[28] UoP must demonstrate expenditure will achieve the target over the issuance period at the latest.
3.7 Energy use in crops (perennial and non-perennial) and livestock systems to reduce CO_2 emissions.	**Energy-efficient traction, irrigation, and storage (in the top 25% of energy efficiency rates for equipment available in-country)** **OR** **Use of only renewable energy on-farm.**	Examples include: ● Solar irrigation pumps ● Agrivoltaics ● Electrical farm vehicles
3.8 Residue management use in crops (perennial and non-perennial) and livestock systems to reduce GHG emissions.	**Optimisation of farm residue use that avoids combustion/degradation and promotes circularity.**	Residue use plan with an estimate of GHG saved: savings required to be at least 10% of baseline residue emissions e.g., recovery and retention of farm residues as raw materials for other industries (e.g., residue biomass as building or furniture material).[29]
3.9 Improved efficiency	**Precision agriculture, use of technology and data to optimize farming practices, thereby**	Estimated improvements in efficiency of input use and/or yields: efficiency gains

[24] 50% is roughly based on scientific consensus that 1.5C pathways need to half animal protein in averaged global diets, as in the EAT–Lancet diet (IPCC, 2022, Sun et al 2022, Willet et al 2019)

[25] This target value is based on the previous Climate Bonds Criteria that had a yearly 2% GHG reduction 2020-2030 and 1.5% reduction 2030-2050 (in-line in EU Taxonomy TEG recommendation).

[26] As suggested under EU Taxonomy technical annex, p. 108

[27] This Criteria element will be expanded into a Climate Bond Alternative Protein Criteria to be published in 2025.

[28] FAO Food Loss Index. An introduction. C. Fabi. 2020 and FLAPP tool at flapp.fao.org

[29] At least 10% as a minimum benchmark, although GHG reductions can be as high as 40%.

through precision agriculture in crops (perennial and non-perennial) and livestock systems to reduce GHG emissions.	**increasing yield, reducing waste, and improving sustainability.** Include digital solutions to improve the efficiency of farming methods and increase yields, for example to achieve the right amount of water for irrigation, or fertiliser use.[30] Include agroecological solutions[31].	required to be > 25% over baseline efficiency (input use and/or yield).

Eligibility requirements for Asset Certification

Asset Certification is valid for a maximum of 12 months and can be renewed at the end of the Certification period.

Whole production units are considered eligible under Asset Certification only where the climate mitigation impact is deemed significant enough over the Certification period and can be demonstrated accordingly. Whole production units can be Asset Certified based on the absolute materiality of their impact on emissions reductions, namely, based on the estimated size of the contribution that a specific measure has to the mitigation of GHG emissions of the whole production unit. For example, the reduction in livestock herds and optimisation of fertiliser use have such a significant impact on the farm's emissions that the whole production unit, as an asset, can be associated to the eligible measure and used as grounds for Asset Certification of the whole unit. In contrast, smaller standalone assets and infrastructure (e.g. storage facilities) can be Asset Certified, but their eligibility does not facilitate the expansion of the Certification to the whole production unit in which they operate.

Physical assets include existing and operational equipment, machinery, infrastructure, buildings, or land. Projects may include physical assets in construction, redevelopment (upgrades, expansion) and similar asset value creation or enhancement activity.

From Standards v.4:[32]

The legal owner of any definable project, asset or portfolio of assets that satisfies the Sector Criteria may apply for Certification of such assets. In an Asset Certification process, the assessment involves only the eligibility of a project, asset, or portfolio of assets under the Sector Criteria and is not related to the financing of these assets. The project, asset, or portfolio to be Certified must be labelled and described in sufficient detail to be clearly identifiable.

Table 5. Asset Certification: eligible measures for reducing absolute emissions (N_2O, CH_4, and CO_2).

Route for Certification	Eligible measure	Demonstration of compliance	Eligible assets
4.1. Reduction of N_2O emissions from N fertiliser use in crops (perennial and non-perennial, including pastures)	**Substituting fossil fuel-based N fertiliser with organic or zero-emissions N fertilisers while maintaining/increasing nitrogen use efficiency (NUE). For new production units: applying organic or zero-emissions N fertilisers while maintaining/increasing NUE.** Examples of eligible N inputs: - Biological N-fixation as the source of nitrogen inputs (e.g., cover crops for green manuring, etc);	A nutrient management plan is in place with evidence of the following: 1) Minimum 50% share of zero-emissions or organic fertilisers (achieved during the period of the Certification), AND 2) Projected significant increase or maintenance of minimum 75% NUE (kg of yield/kg of N applied) in line with optimum values of N application rates (should including	Eligible assets can include: - whole production unit (land), AND/OR - any physical assets required for reducing N_2O emissions from fertiliser use (i.e., machinery for precision

[30] EU Taxonomy technical annex, p. 362

[31] Agroecology> IPCC AR6 Chapter 7, p. 798 & > CGIAR The Measure of Agroecology

[32] https://www.climatebonds.net/standard/the-standard

	- Green ammonia;[33] - Commercial organic N fertilisers.[34] Example of eligible practices to increase NUE: - Site-specific nutrient management (SSNM).[35] Not eligible: substitution based on fertilising with manure from intensive livestock operations and factory farms, following definitions from the EU Industrial Emissions Directive.[36]	temporal datasets on N inputs and yields).[37] OR 3) Measurable reduction of N_2O emissions relative to its baseline of at least 1.5% per year (measured following GHG Protocol guidance).[38] OR *A proxy for this measure can also be a certification or conversion plan for the production unit to certified organic agriculture (IFOAM).*	application of fertilisers).
4.2. Organic fertiliser production and use in crops (perennial and non-perennial, including pastures) and livestock production units, to reduce N_2O, CH_4 and/or CO_2 emissions.	**On-farm organic fertiliser production and use, including composting/biochar from farm residues (including vermi-composting).** Not eligible: fertilising with manure from intensive livestock operations and factory farms, following definitions from the EU Industrial Emissions Directive.[39]	A farm management plan which evidences the significance of the measure to reduce emissions, including the following: 1) Volume of on-farm organic fertiliser or compost/biochar produced, AND 2) Sustainability of source and volume of farm residues utilised, AND 3) Intended use of the organic fertiliser production. OR 4) Measurable reduction of GHG emissions relative to a baseline of at least 1.5% per	Eligible assets can include: - whole production unit (land), AND/OR - physical assets required for producing organic fertiliser and/or biochar on-farm (e.g., energy efficient pyrolysis kiln or reactor, with gas recovery and/or heat reuse systems).

[33] Zero-carbon ammonia, called 'green ammonia', uses renewable energy to power electrolysis to produce hydrogen from water (replacing the steam methane reforming process based on hydrocarbon feedstocks) and the subsequent ammonia synthesis. Ammonia production is covered under the Climate Bonds Basic Chemicals Criteria available at https://www.climatebonds.net/standard/available

[34] https://www.sciencedirect.com/science/article/abs/pii/S0048969722052317

[35] See Section 6.4 in Mukherji, A., Marshall S., Arango, J., Costa Jr, C., Flintan, F., Hebebrand, C., Kihara, J., Masso, C., Molloy, P., Rusinamhodzi, L., Sapkota, T., Vanlauwe, B. (2024). 2024 Breakthrough Agenda Report: Agriculture, CGIAR, Montpellier, France. https://hdl.handle.net/10568/152247; pp: 44

[36] Pig farms with more than 350 livestock units (LSU) (equivalent to approximately 1100 adult pigs and 700 sows), poultry farms with laying hens with more than 300 LSU and broilers with more than 280 LSU (equivalent to approximately 40000 chickens for meat, and 21400 laying hens). For farms rearing both pigs and poultry the limit will be 380 LSU. https://www.europarl.europa.eu/news/en/press-room/20240308IPR19007/reducing-pollution-from-industry-and-large-livestock-farms For LSU conversions see: https://ec.europa.eu/eurostat/statistics-explained/index.php?title=Glossary:Livestock_unit_(LSU)
For bovine cattle, the limit will be for farms with more than 150 LSU, as originally proposed by the Commission.
https://www.europarl.europa.eu/news/en/press-room/20231127IPR15436/pollution-deal-with-council-to-reduce-industrial-emissions.

[37] Breakthrough report page recommendation A.2 https://agriculture-breakthrough2024.cgiar.org/section-7-recommendations-for-international-collaborative-action

[38] This is based on the previous Climate Bonds Criteria that had a yearly 2% GHG reduction 2020-2030 and 1.5% reduction 2030-2050 (in-line in EU Taxonomy TEG recommendation).

[39] Pig farms with more than 350 livestock units (LSU) (equivalent to approximately 1100 adult pigs and 700 sows), poultry farms with laying hens with more than 300 LSU and broilers with more than 280 LSU (equivalent to approximately 40000 chickens for meat, and 21400 laying hens). For farms rearing both pigs and poultry the limit will be 380 LSU. https://www.europarl.europa.eu/news/en/press-room/20240308IPR19007/reducing-pollution-from-industry-and-large-livestock-farms For LSU conversions see: https://ec.europa.eu/eurostat/statistics-explained/index.php?title=Glossary:Livestock_unit_(LSU)
For bovine cattle, the limit will be for farms with more than 150 LSU, as originally proposed by the Commission.
https://www.europarl.europa.eu/news/en/press-room/20231127IPR15436/pollution-deal-with-council-to-reduce-industrial-emissions.

		year (measured following GHG Protocol guidance).[40] OR 5) For biochar production equipment; top 25% of energy efficiency rates for equipment available in-country.	
4.3. Improved flooded rice systems to reduce methane (CH_4) emissions in rice cropping systems	**Improved rice production through effective water management and residue straw management by implementing practices aimed at reducing days of flooding by at least 10%.**	A rice production management plan that demonstrates a reduction in days of flooding by at least 10% by outlining one or more of the eligible practices:[41] • Shallow flooding: utilising shallow water levels to optimise growth. • Direct-seeded rice: planting rice directly in the field for improved establishment. • Short-duration, high-yielding varieties: selecting varieties that mature quickly while maximising yield. • Midseason drying events: allowing the field to dry midway through the growing season to enhance soil health. • Alternate wet and dry techniques: alternating between wet and dry conditions to conserve water and improve rice quality. AND • Off-Season straw management: properly managing straw during the off-season to benefit soil health. OR Measurable reduction of CH_4 emissions relative to a baseline of at least 1.5% per year (measured	Eligible assets can include: - <u>whole production unit (land),</u> AND/OR - physical assets required for improved rice production through effective water management and residue straw management (e.g., new adapted irrigation infrastructure for reduced flooding).

[40] This target value is based on the previous Climate Bonds Criteria that had a yearly 2% GHG reduction 2020-2030 and 1.5% reduction 2030-2050 (in-line in EU Taxonomy TEG recommendation).
[41] EU Taxonomy Technical Annex, p. 131

		following GHG Protocol guidance).[42]	
4.4 Transform livestock systems to lower CH_4 emissions in livestock or mixed systems.	**Transition farm income towards reduced herd size**.[43] Reducing herd sizes by at least 50% in large operations can lower methane emissions, while supporting carbon sequestration efforts through improved grazing practices. Investments in alternative proteins (e.g., plant-based or cultured meats) and lower-emission livestock systems can provide economic opportunities for farmers while contributing to global food security.	A farm management plan which evidences the significance of the measure to reduce herd sizes, including the following: 1) Reduced livestock operation to be at least 50% of LSU with investments in physical assets for potential substitutions in other production systems with lower GHG footprint (i.e., plant-based protein production), while supporting farm income;[44] OR 2) Measurable reduction of CH_4 emissions relative to a baseline of at least 1.5% per year (measured following GHG Protocol guidance).[45] Note: Climate Bonds Alternative Protein Criteria will be available in early 2025.	Eligible assets can include: - whole production unit (land), AND/OR - physical assets required for transitioning to reduced herd size.
4.5 Harvest, post-harvest and storage to reduce food loss to reduce GHGs in crops (perennial and non-perennial) and livestock systems.	**Optimise harvest, post-harvest and/or storage facilities before the point of distribution to avoid production-level food loss.**	Improved harvest, post-harvest and/or storage must aim at achieving a level of food loss no higher than 10% of total food production from post-harvest to distribution, except for cereals and grains which should aim towards less than 5% food loss).[46] Certified Asset must demonstrate target value over the year of certification.[47]	Eligible assets can include: - physical assets required for reducing food loss (e.g., optimised grain storage silos).
4.6 Energy use in crops (perennial and non-perennial) and livestock systems to reduce CO_2 emissions.	**Energy-efficient traction, irrigation, and storage (in the top 25% of energy efficiency rates for equipment available in-country),** **OR** **Use of only renewable energy on-farm.**	Examples include: ● Solar irrigation pumps ● Agrivoltaics ● Electrical farm vehicles	Eligible assets can include: - physical assets required for energy efficiency or renewable energy use (e.g., electrical tractor).

[42] This target value is based on the previous Climate Bonds Criteria that had a yearly 2% GHG reduction 2020-2030 and 1.5% reduction 2030-2050 (in-line in EU Taxonomy TEG recommendation).
[43] As suggested under EU Taxonomy technical annex, p. 108
[44] 50% is roughly based on scientific consensus that 1.5C pathways need to half animal protein in averaged global diets, as in the EAT–Lancet diet (IPCC, 2022, Sun et al 2022, Willet et al 2019). For Asset Certification, it is assumed that this level is achieved or planned to achieve during the Certification period, i.e., one year.
[45] This target value is based on the previous Climate Bonds Criteria that had a yearly 2% GHG reduction 2020-2030 and 1.5% reduction 2030-2050 (in-line in EU Taxonomy TEG recommendation).
[46] FAO Food Loss Index. An introduction. C. Fabi. 2020 and FLAPP tool at flapp.fao.org
[47] They should be required to demonstrate (at the initial verification engagement) how this will be achieved. Certification can only be awarded if the verifier can confirm that procedures will be adhered to and targets will be achieved.

4.7 Residues management use in crops (perennial and non-perennial) and livestock systems to reduce GHG emissions.	**Optimisation of farm residue use that avoids combustion/degradation and promotes circularity.**	Residue use plan with an estimation of GHG saved: savings required to be at least 10% of baseline residue GHG emissions, e.g., recovering and retention of farm residues as raw materials for other industries (e.g., residue biomass as building or furniture material).[48]	Eligible assets can include: - physical assets required for improved residue management.
4.8 Improved efficiency through precision agriculture	**Precision agriculture: use of technology and data to optimise farming practices, thereby increasing yield, reducing waste, and improving sustainability.** Include digital solutions to improve the efficiency of farming methods and increase yields, for example to achieve the right amount of water for irrigation, or fertiliser use.[49] Include agroecological solutions[50].	Estimated improvements in efficiency of input use and/or yields: efficiency gains required to be > 25% over baseline efficiency (input use and/or yield).	Eligible assets can include: - physical assets required for improved efficiency through precision farming developments (e.g. soil and crop sensors, drones, and GPS-enabled machinery).

Box 1. Examples of routes for UoP *vs.* Asset Certification for reducing emissions

Example 1: A soy producer in China aims to invest in equipment and infrastructure to reduce emissions from fertiliser use, under the eligible measure of 'Substituting fossil fuel-based N fertiliser with organic or zero-emissions N fertilisers while increasing nitrogen use efficiency (NUE).' They could apply for UoP Certification to finance the equipment and infrastructure needed for such measure (e.g., precision fertilisation equipment, fertiliser injection equipment, composting manufacturing infrastructure), AND/OR include the whole production unit(s) as the nominated asset where the full set of measures will be implemented. They could also include in the UoP expenditures for carbon sequestration, climate adaptation and/or supporting activities.

Example 2: A cattle producer in Brazil aims to issue a UoP bond to reduce the herd size by 50% over 10 years and to do so it is purchasing land and equipment to diversify the portfolio with the establishment of diversified orchards. The project aiming at implementing this eligible measure includes a range of assets that could be potentially certifiable: the land for the expansion of the portfolio of crops (orchard land), the equipment necessary for planting and managing the crop (e.g., machinery), and storage facilities for the harvest and post-harvest handling of the crop. Each of those assets and/or the whole production unit could be considered eligible under UoP Certification. In contrast, for Asset Certification (to certify the whole production unit as an asset), the eligible measure ('transition farm income towards reduced herd size') and its targets for compliance would need to be demonstrated in the year of Certification, and renewed annually.

Example 3: A winegrape producer is investing in an improved storage facility for the post-harvest handling and storage of the crop. The storage facility and post-harvest equipment would be eligible under UoP or Asset Certification. In the case of an Asset Certification, this would not cover the whole production unit because the climate mitigation materiality of the measure would not be applicable to the whole of the farming operation. Similarly, if the farm was investing in electrification of its vehicles (e.g., electric tractors), Asset Certification would apply to the associated equipment and infrastructure, but not to the whole production unit, for the same climate materiality reason.

[48] At least 10% as a minimum benchmark, although GHG reductions can be as high as 40%.

[49] EU Taxonomy technical annex, p. 362

[50] Agroecology> IPCC AR6 Chapter 7, p. 798 & > CGIAR The Measure of Agroecology

B. Measures to sequester carbon in agricultural land

Eligible measures aimed at sequestering carbon in agricultural land are diverse and often context-specific. However, the measures outlined below (Table 6) represent a set of interventions for specific farming systems that are scientifically established to increase carbon in agricultural land when performed under the right conditions, with relatively high certainty across a range of climatic and biophysical farming situations.[51] They have been selected from the scientific literature as those with the highest certainty to maintain existing carbon sinks and/or increase carbon sequestration in above- and/or below-ground carbon stocks.

Eligible measures fall under five overarching interventions related to carbon sequestration (listed in decreasing order of global average mitigation potential as estimated by the IPCC AR6):

1. Restoration of agricultural land.
2. Agroforestry.
3. Application of biochar.
4. Increasing soil organic carbon in grasslands.
5. Increasing soil organic carbon in croplands.

The one general condition that precludes any significant durable carbon sequestration impact for any eligible measure is the increase of organic carbon (biomass) input in the agricultural land. Without a sustained increase of carbon input, carbon sequestration generally cannot occur. This carbon input can take many forms (e.g., biomass residues, biochar, organic matter amendments) and it should be sourced sustainably and without undesirable leakages (e.g., depleting carbon from one system to add it into another).

Hence, the set of eligible interventions outlined in Table 6, must all follow and demonstrate one condition:

> ***There should be an increased carbon input into the production unit that is subject to the carbon sequestration claim of at least 20% from the baseline year over the following 10 years, and thereafter the carbon stock must be maintained and/or increased up until 2050 or at least 20 years from baseline date.***[52]

This condition acts as a proxy for the accounting of the carbon sequestration itself, making compliance with the intervention simpler for applicants (agriculture producers) without the need for reporting on the full carbon stock accounting and/or measurement.

However, this condition also applies to applicants that choose to provide full carbon accounting of carbon sequestration claims following the GHG Protocol Land Sector and Removals Guidance. In this case, the requirement is replaced with the following:

> ***for carbon sequestration estimates (e.g., tC $ha^{-1}yr^{-1}$) to progressively increase on an annual basis from the baseline year over the following 10 years, and thereafter the carbon stock must be maintained and/or increased up until 2050 or at least 20 years from baseline date.***[53]

For livestock systems, the findings from a recent scientific assessment need to be taken into consideration, which concluded that 'one hectare of grassland potentially sequestering an additional 50 t of soil organic carbon (SOC) can compensate enteric CH_4 emissions of about 1.25 heads of cattle'. Hence, 'soil carbon sequestration potential in grasslands can only possibly cancel out a continuous flow of enteric CH_4 emissions in rather extensive systems (mostly with a cattle density lower than one head per hectare), whereas the density in practice is generally much higher than that'. The study recommends: 'It is worth emphasizing that, compared with the findings from other studies which investigated soil C-sequestration potential, a SOC increase of 50 t ha^{-1} seems to be rather challenging and might be rarely reached. This, however, further strengthens our conclusions and concern that current animal densities are too high to fully compensate climate impacts by means of soil C-sequestration in grasslands'.[54]

The GHG Protocol Land Sector and Removals methodology is subject to five conditions for inclusion:[55]

- Ongoing storage monitoring.
- Traceability.
- Primary data.

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[51] Intergovernmental Panel on Climate Change (IPCC) (ed.) (2023) Climate Change 2022 - Mitigation of Climate Change: Working Group III Contribution to the Sixth Assessment Report of the Intergovernmental Panel on Climate Change. 1st edn. Cambridge University Press. Available at: https://doi.org/10.1017/9781009157926.

[52] Climate Bonds Agriculture criteria (2021) Agriculture Criteria Background paper, (2021), p. 24, 25

[53] Noting the following exception: for soils where it can be demonstrated that saturation levels have been reached, no further increase in carbon content is expected. In this case, existing levels should be maintained long-term (with a 20-year plan, at the minimum).

[54] Wang, Y., de Boer, I.J.M., Persson, U.M. *et al.* Risk to rely on soil carbon sequestration to offset global ruminant emissions. *Nat Commun* 14, 7625 (2023). https://www.nature.com/articles/s41467-023-43452-3

[55] GHG Protocol (2022), Land Sector and Removals Guidance | GHG Protocol, Draft for Pilot Testing and Review Details on each of these specific aspects are discussed in Chapter 6 – Removal Accounting pp. 84-101.

- Uncertainty.
- Reversals accounting.

These five conditions also apply to any eligible UoP or Asset Certification under the Agriculture Production Criteria.

For UoP Certification, proceeds must finance expenditures required for the implementation of the eligible measure(s), potentially including CAPEX and/or OPEX (from Table 6). A given UoP debt might be associated with more than one carbon sequestration measure in addition to including other eligible measures under reducing emissions (Table 4), adaptation (Table 8), and/or supporting activities (Table 9).

For Asset Certification, whole production units are certifiable for all eligible measures, based on the absolute materiality of their impact on emissions mitigation. However, annual Certification of a production unit as an Asset will be subjected to the requirements beyond that timeframe (10 years and 20 years).

Table 6. UoP and Asset Certification: eligible measures for carbon sequestration with information on route(s) for Certification, eligible measures and required demonstration of compliance. All the eligible measures can be applied to the whole production unit(s) or as separated activities within production units.

Route(s) for Certification (climate objectives) (from highest to lowest C sequestration potential globally)	Eligible measures	Demonstration of compliance
1. Restore agricultural land.	Reforestation and/or restoration, including:[56] ● peatland, ● mangroves/wetlands, ● overgrazed grasslands with depleted soil organic carbon.	Verified restoration plan including the following:[57] 1) Geolocation of land plots and demonstration of historical land use pre-application. AND 2) Verified management plan that ensures conditions A or B for increased carbon input or carbon sequestration (Table 7).
2. Implement or maintain agroforestry (incorporating woody perennials into agriculture production units). [58]	● agroforestry in croplands including perennial crops (e.g., cocoa), ● agroforestry in silvopastoral systems (grasslands and pasture lands).[59]	Verified management plan that ensures conditions A or B for increased carbon input or carbon sequestration (Table 7). And, if option B, this specific metric: ● At a minimum, estimated carbon sequestration potential must be above 0.6 tC ha^{-1} yr^{-1} of carbon aboveground.[60]

[56] shifting from non-forest cover to forest cover at 30% tree cover threshold with a region-specific natural forest regrowth.
[57] Adapted from recommendations in "Greenhouse Gas Protocol *Land Sector and Removal Guidance* (September, 2022)"
[58] Agroforestry is defined by the FAO as land use systems and technologies where woody perennials (trees, shrubs, palms, bamboo, etc) are deliberately used on the same land management units as agricultural crops and/or animals, in some form of spatial arrangement or temporal sequence. See www.fao.org/forestry/agroforestry/80338/en and see IPCC WGIII Chapter 7, Section 7.4.3.3 Agroforestry p. 790.
[59] Silvopastoral systems are those that combine tree growing with the production of livestock. https://www.sciencedirect.com/topics/agricultural-and-biological-sciences/silvopastoral-systems.
[60] The carbon sequestration potential of agroforestry (including both grasslands and croplands) has been found to range between 0.59 and 6.24 t ha–1 yr–1 of carbon above-ground. Below-ground carbon often constitutes 25% or more of the potential carbon gains in agroforestry systems (IPCC, AR6 WGIII, Chapter 7, p. 791).

3. Apply biochar to agricultural lands.	Application of biochar produced with biomass residues sourced from deforestation- and conversion-free (DCF) agricultural land.[61]	Verified management plan that ensures conditions A or B for increased carbon input or carbon sequestration (**Table 7**). AND Verified farm management plan including: 1) information of the quantity and sourcing of biochar (from DCF residues), 2) application rate, 3) edaphic conditions that secure biochar stability.
4. Improve soil carbon management in grasslands and pasturelands.	• **Vegetation management**: improved grass varieties/sward composition, deep rooting grasses, increased productivity (without additional fossil-fuel fertiliser inputs). • **Livestock management**: fitting stocking densities to carrying capacity, fodder banks, and fodder diversification. • **Fire management:** improved use of fire, including fire prevention and improved prescribed burning.[62]	Verified management plan that ensures conditions A or B for increased carbon input or carbon sequestration (**Table 7**).
5. Improve soil carbon management in croplands.	• **Crop management**: e.g., improved crop varieties, crop rotation, use of cover crops, shifting to perennial cropping systems (including agroforestry), crop diversification. • **Nutrient management**: fertilisation with organic amendments/green manures. • **Reduced tillage** with residue retention.	Verified management plan that ensures conditions A or B for increased carbon input or carbon sequestration (**Table 7**). In addition: • For nutrient management, the requirement is for increases in NUE and/or not additional net N_2O emissions. • For reduced or no tillage, the requirement is for at least 30% of crop residues left on the soil surface permanently (this should be reflected in the farm management plan).[63]

One of the two conditions in Table 7 are required for demonstration of compliance of any of the eligible practices outlined in Table 6. Measures aimed at maintaining carbon storage, in cases where land or soil is already close to maximum potential for C sequestration, are eligible as far as they can demonstrate carbon storage levels and a management plan to maintain them.

[61] According to IPCC AR6 WGIII Chapter 7: '*Biochar is produced by heating organic matter in oxygen-limited environments (pyrolysis and gasification). Feedstocks include forestry and sawmill residues, straw, manure and biosolids. When applied to soils, biochar is estimated to persist from decades to thousands of years, depending on feedstock and production conditions*.'

[62] From IPCC, 2022, AR6 WGIII, Chapter 7, p.788. All these measures are recognised as Sustainable Soil Management Practices by FAO (Baritz et al. 2018).

[63] https://iopscience.iop.org/article/10.1088/1748-9326/ab503b also: low till refers to the practices of no-till, reduced-till, strip tillage, mulch tillage, row till and contour till https://iopscience.iop.org/article/10.1088/1748-9326/ad3f32

Table 7. Additional demonstration of compliance for carbon sequestration eligible measures for UoP and Asset Certification to be included in verified farm management plan (one of two options A or B).

Required verified farm management plan must demonstrate one of two conditions: A or B.	Demonstration of compliance
A: Annual increase of carbon input into the production unit of at least 20% from the baseline year over the following 10 years, plus its maintenance up until 2050 or at least 20 years from baseline date.	Verified farm management plan must include: ● Baseline of carbon input into the production unit. ● Estimation of increased carbon input, including targets with base year/period (with at least 20% increase from the baseline year over 10 years). ● Expected length of carbon input increase (20 years minimum). ● Metrics, methods, data, and assumptions used to quantify temporary carbon inputs and maintenance. ● Demonstration of no net increase of N_2O emissions (e.g., from increased N fertiliser use). ● Demonstration of likelihood of permanence: e.g., secure land rights, low threat of conversion, contractual commitments.
B: Annual increase of carbon sequestration estimates from the baseline year over the following 10 years, and thereafter the carbon stock must be maintained up until 2050 or at least 20 years from the baseline date.	Verified farm management plan must include: ● Baseline of carbon content in the production unit. ● Estimation of increased carbon sequestration, including targets with base year/period, with a rate of C increase of at least 0.2 t C ha^{-1} yr^{-1} over 10 years, but it is highly recommended to be 0.4 t C ha^{-1} yr^{-1} over 10 years (as in SBTi FLAG and for Climate Bonds entity certification). [64] ● Expected length of carbon storage (20 years minimum). ● Metrics, methods, data, and assumptions used to quantify temporary carbon storage (including crop plans and baseline values). ● Demonstration of no net increase of N_2O emissions (e.g., from increased N fertiliser use). ● Demonstration of likelihood of permanence: e.g., secure land rights, low threat of conversion, contractual commitments.
For both options: Technical and cost-effective carbon sequestration potential calculated by country in the database by Roe et al 2021 should be used to benchmark and verify carbon sequestration claims of interventions in different locations. Excel database can be found in this link under Supporting Information: https://onlinelibrary.wiley.com/doi/10.1111/gcb.15873).	

3.4.1 Demonstration of compliance: certified carbon accounting auditor

The applicant shall provide evidence that the eligible measures will achieve a performance consistent with one of the two conditions explained in Table 7 (i.e., increased carbon input and/or sequestration in t C ha^{-1} yr^{-1}), and that the applicant has a contract or agreement with a certified carbon accounting auditor, demonstrating in an annual report and a detailed farm management plan that the estimated increased carbon input and/or sequestration claim can be achieved. There are a range of

[64] 0.2 tC ha^{-1} yr^{-1} is based on the lower average range in Lessman et al. 2022, which is the lower range for SOC increase in croplands, which in turn is the intervention practice with the lowest potential. With this minimum value, it is ensured interventions are material in a wide variety of climatic and soil conditions. SOC increases should aim towards much higher values in agroforestry, biochar, and other practices. Lessmann, M. et al. (2022) 'Global variation in soil carbon sequestration potential through improved cropland management', Global Change Biology, 28(3), pp. 1162–1177. https://doi.org/10.1111/gcb.15954. In addition, recommended guidance in SBTi FLAG (Roe et al 2019) for 0.4 tC ha^{-1} yr^{-1} can be followed, see Roe, S., Streck, C., Obersteiner, M. *et al.* Contribution of the land sector to a 1.5 °C world. *Nat. Clim. Chang.* **9**, 817–828 (2019). https://doi.org/10.1038/s41558-019-0591-9

tools available for carbon sequestration accounting, and the GHG Protocol methodology for the land sector should be followed irrespective of the selected tool.

*Note the following exception: For soils specifically, where it can be demonstrated that saturation levels have been reached, no further increase in carbon content is expected. In this case, existing levels should be maintained.

3.5 Measures eligible for climate adaptation in agricultural lands (production units)

Agriculture producers aiming for UoP Certification and/or Asset Certification to adapt to climate change can apply eligible measures and activities summarised in Table 8.

Many climate adaptation interventions have synergies with mitigation measures (i.e., agroforestry) and hence are included under Section 3.2 with a primary focus on mitigation of GHG emissions.

Table 8. UoP and Asset Certification: eligible measures for climate adaptation in agriculture production units, including route(s) for Certification, climate adaptation option, eligible measures, and required demonstration of compliance.

Route(s) for Certification for climate adaptation	Climate adaptation option	Eligible measures	Demonstration of compliance
Agronomic management	Organic management.	Use of certified organic practices e.g., no/low tillage or crop residue retention to increase soil health.	Third-party certification (IFOAM).
	Adjustment of planting dates and crop switching.	Changes in cropping pattern and crop systems e.g., shifting planting schedules in response to the early or late onset of the rainy season, and marketing to facilitate crop switching.	Verified farm management plan that verifies a significant Adaptation and Resilience (A&R) benefit.
	Shifting cropping location in response to climate.	Changes in cropping location due to climate hazards.	Verified farm management plan that verifies a significant A&R benefit.
	Flood risk reduction measures.	Floodplain restoration, saltmarshes, mangroves or peat renaturalisation.	Verified restoration plan that includes the following:[65] 1) Geolocation of land plots and demonstration of historical land use. 2) Estimation of flood risk reduction, including targets with base year/period. 3) Expected length of flood risk reduction (20 years minimum). 4) Metrics, methods, data, and assumptions used to quantify flood risk reduction. 5) Demonstration of likelihood of permanence: e.g., secure land rights, low threat of conversion, contractual commitments.

[65] Adapted from recommendations in "Greenhouse Gas Protocol *Land Sector and Removal Guidance* (September, 2022)"

Agriculture diversification	Mixed systems.	Shift production unit to a combination of crops and, livestock and/or fish and/or trees.	Verified farm management plan that includes the following: ● Estimate of agriculture diversification effect, including targets with base year/period, which verifies a significant A&R benefit.
	Landscape diversification.	For example, rotational grazing, fire management to control woody thickening of grass.	Verified farm management plan, that includes the following: ● Plans for landscape diversification and estimates of A&R benefit.
Infrastructure and technology	On-farm irrigation and water management.	Measures to adjust water management based on seasonal and spatial patterns of present and projected water availability, with proof of no maladaptation e.g., rainwater storage and deficit irrigation techniques.	Verified farm management plan that includes the following: 1) Plans for improved water management (i.e., water savings and improved water-use efficiency). 2) Proof of no maladaptation for irrigation practices required.
Supporting activities within agriculture production units	Training and capacity building on climate change responses.	Measures to enhance the strengths and attributes of, and resources available to, an individual, community, society or organisation to respond to climate change.	Verified training and capacity building plan at the appropriate scope and boundary, and estimations of A&R benefit.
	Economic/ financial measures.	Incentives towards livelihood diversification and social protection such as crop insurance. New crop insurance schemes based on changes in weather patterns.	Verified implementation plan of economic/financial measures that confirms a significant A&R benefit.
Genetic improvements	Use of climate-resilient cultivars and/or breeds and/or breeding of climate-resilient traits.	Eligible traits for resistance to biotic and abiotic stress, including drought tolerance, heat tolerance, flood tolerance, and pest resistance.	Verified implementation plan including estimate of A&R benefits and attention to yield penalty in average years.
Collective resource management	Community seed/feed/fodder banks.	Strengthens regional production capabilities, shares costs, and de-risks individual producers e.g., Village Resource Centres.	Verified implementation plan including estimate of A&R benefits.
Climate services	Improved weather forecasting and early warning systems.	Technical and institutional measures to forecast, predict, and communicate timely and meaningful warning information e.g., integrating information from multiple sources at different scales, participatory collection and analysis of climate data, making forecast information available in local languages and for the non-literate, which helps contribute to disaster risk reduction management and accuracy in decision-making on farms.	Verified implementation plan including estimate of A&R benefits.

3.6 Supporting activities to enable climate mitigation and adaptation in or outside of production units

In addition to eligible measures in agriculture production units, there are supporting activities (and resulting products or services) aimed at enabling climate mitigation and adaptation by third-party applicants (outside of production unit(s)) that can be Certified. Eligible measures supporting activities are included in Table 9.

Table 9. UoP and Asset Certification: eligible measures for supporting activities aimed at enabling climate mitigation and/or adaptation in or outside of agriculture production unit(s).

Route(s) for Certification for supporting activities	Climate mitigation and/or adaptation supporting measures	Details	Demonstration of compliance
Supporting activities within and/or outside of production units	Training and capacity building on climate change responses.	Measures to enhance the strengths and attributes of, and resources available to, an individual, community, society or organisation to respond to climate change.	Verified training and capacity building plan at the appropriate scope and boundary, and estimations of A&R benefit.
	Economic/financial measures.	Incentives towards livelihood diversification and social protection.	Verified implementation plan of economic/financial measures, and estimations of A&R benefit.

R&D for genetic improvements	Breeding of climate-resilient traits.	Eligible traits for resistance to biotic and abiotic stress, including drought tolerance, heat tolerance, flood tolerance and pest resistance, both in crop cultivars and animal breeds.	Verified implementation plan including estimation of A&R benefits. (Not applicable for Asset Certification.)
Collective resource management	Community seed/feed/fodder banks.	Strengthens regional production capabilities, shares costs and de-risks individual producers.	Verified implementation plan including estimation of A&R benefits.
Climate services	Weather forecasting and early warning systems.	Technical and institutional measures to forecast, predict, and communicate timely and meaningful warning information e.g., include integrating information from multiple sources at different scales, participatory collection and analysis of climate data, making forecast information available in local languages and for the non-literate, which helps contribute to disaster risk reduction management and accuracy in decision-making on farms.	Verified implementation plan including estimation of A&R benefits.
Climate services	GHG assessment: measuring and accounting for GHG emissions.	GHG assessment of sources of emissions and sinks on the farm. Existing and verified tools should be used.	Existing and verified tools should be used, following GHG Protocol Land Sector methodology. (Not applicable for Asset Certification.)
R&D for climate mitigation	R&D on farming practices and technologies to reduce enteric fermentation methane emissions.	Include advances in methane inhibitors (e.g., feed additives) and low-methane forages.[66] Can be activities applied within production unit(s) or outside production unit(s).	Verified implementation plan including estimation of climate mitigation benefits required to be at least 25% GHG emission reduction over the period of the issuance. (Not applicable for Asset Certification.)
R&D for climate mitigation	R&D on farming practices and technologies to increase uptake of GHG in agriculture lands.	Include advances in nitrification inhibitors and enhancing the uptake of CH_4 and N_2O in agriculture lands[67]. Can be activities applied within production unit(s) or outside production unit(s).	Verified implementation plan including estimation of climate mitigation benefits required to be at least 25% GHG emission reduction over the period of the issuance. (Not applicable for Asset Certification)
Services contributing to deforestation- and natural ecosystem conversion-free sourcing	Land-use change monitoring or traceability systems.	Examples of such activities include, but are not limited to the following: • Traceability software or hardware systems. • Satellite monitoring systems.	Verified implementation plan and estimations of benefits for DCF sourcing.

[66] Mukherji, A., Marshall S., Arango, J., Costa Jr, C., Flintan, F., Hebebrand, C., Kihara, J., Masso, C., Molloy, P., Rusinamhodzi, L., Sapkota, T., Vanlauwe, B. (2024). 2024 Breakthrough Agenda Report: Agriculture, CGIAR, Montpellier, France. https://hdl.handle.net/10568/152247; pp: 44

[67] Global Change Biology (2007) 13, 1–17, doi: 10.1111/j.1365-2486.2006.01280.x and https://doi.org/10.1016/j.geoderma.2021.114931

4 Entity and Sustainability-Linked Debt Certification

The Agriculture Production Criteria detailed in this section can be used to Certify:

- A whole entity (in this case, an agricultural production company, or part of the company producing any agrifood commodity (under Section 4.1);
- Sustainability-linked debt (SLD) issued by an entity dedicated to producing agriculture commodities (under Section 4.2).

The sections below contain methodological notes applicable to these Criteria.

See also the Climate Bonds Standard for the cross-sectoral requirements for Entity Certification and SLD Certification relating to transition plans, disclosure for the Certified entity, and requirements relating to the parent group. These cross-sectoral requirements must be met in addition to the specific requirements described here for agricultural production.

NOTE: *Current proposals allow for the Certification of part of a company or group of companies, or SLD, that relate to part of a company or group of companies (see the Climate Bonds Standard for full details). This flexibility enables Certification of the part of a company or group of companies relating to agriculture production, separate from the Certification of other group or company activities of which it forms a part.*

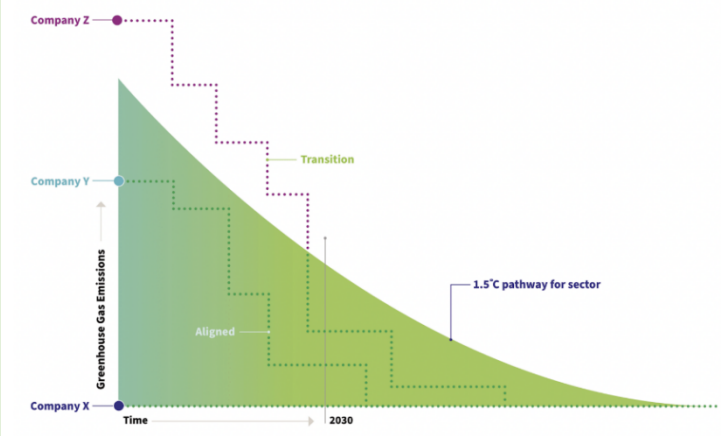
4.1 Agricultural Production Criteria for Entity Certification

Certification requires compliance with the Climate Bonds Standard Agriculture Production Criteria (explained in this document). Two levels of Entity Certification are available, depending on when the climate mitigation performance targets align with the Climate Bonds Standard and these Agriculture Production Criteria (see Box 2 and Climate Bonds Standard).

Box 2: Two levels of Entity Certification under Climate Bonds Standard

Two levels of entity Certification are available, depending on when the climate mitigation performance targets align with 1.5°C.

1. Level 1 – 'Aligned': The climate mitigation performance targets align with the Criteria at the time of Certification and thereafter until the date the climate mitigation performance targets meet the 1.5°C transition pathway or 2050, whichever is sooner.
2. Level 2 – 'Transition': The climate mitigation performance targets do not align with the Criteria at the time of Certification but align by 31 December 2030 and thereafter until the date the climate mitigation performance targets meet the 1.5°C transition pathway or 2050, whichever is sooner.



Source: Climate Bonds

Table 10. Requirements for Entity Certification on two levels: 'Aligned' with the 1.5°C pathway for agriculture production and 'Transition' to the 1.5°C pathway for agriculture production.

Entity Certification Tier	Entity Certification requirements
Level 1: Aligned	1. **Climate Mitigation Criteria** • At the time of Certification, the entity can demonstrate that its agricultural production land is **deforestation- and conversion-free since 2010**, see Section 4.1.1., *and* • At the time of Certification, the entity's average emission intensity meets the sector-specific Criteria transition pathway, and its future **climate mitigation performance targets** continue to align with the transition pathway through to **2050**, see Section 4.1.2. • Removals at entity level: at the time of Certification, the entity demonstrates that it meets the quantity of carbon sequestration required to align with the pathway at the entity level, see Section 4.1.5. 2. **Adaptation and Resilience safeguard** • The Certified entity meets the Adaptation and Resilience safeguard described in Section 5.1, which is reassessed and reconfirmed every five years. 3. **Environmental and social safeguards** • Biodiversity (Section 5.2), • Water (Section 5.3), • Social (Section 5.4), • Animal welfare (if applicable: only for livestock production units) (Section 5.5).
Level 2: Transition	1. **Climate Mitigation Criteria** The Criteria are the same as for Level 1, except: • At the time of Certification, the entity can demonstrate that its agricultural production land is **deforestation- and conversion-free since 2020***, see Section 4.1.1., *and* • The Certified entity's average emission intensity does NOT meet the sector-specific Criteria transition pathway at the time of Certification, but the **future climate mitigation performance targets align by 31 December 2030** and continue to align thereafter through to 2050. See Section 4.1.2. • Removals at entity level: at the time of Certification, the entity demonstrates that it meets the quantity of carbon sequestration required to align with the pathway at the entity level, see Section 4.1.5. 2. **Adaptation and Resilience safeguard** • The Certified entity meets the Adaptation and Resilience safeguard described in Section 5.1, which is reassessed and reconfirmed every five years. 3. **Environmental and social safeguards** (same as Level 1) • Biodiversity (Section 5.2), • Water (Section 5.3), • Social (Section 5.4), • Animal welfare (if applicable: only for livestock production units) (Section 5.5). **NOTE: After 2030, the entity can be certified as 'Aligned' if a land restoration plan has been implemented on land deforested or converted between 2010 and 2020.*

Figure 5 shows a schematic representation of the Criteria for Entity and SLD Certification for agriculture production.

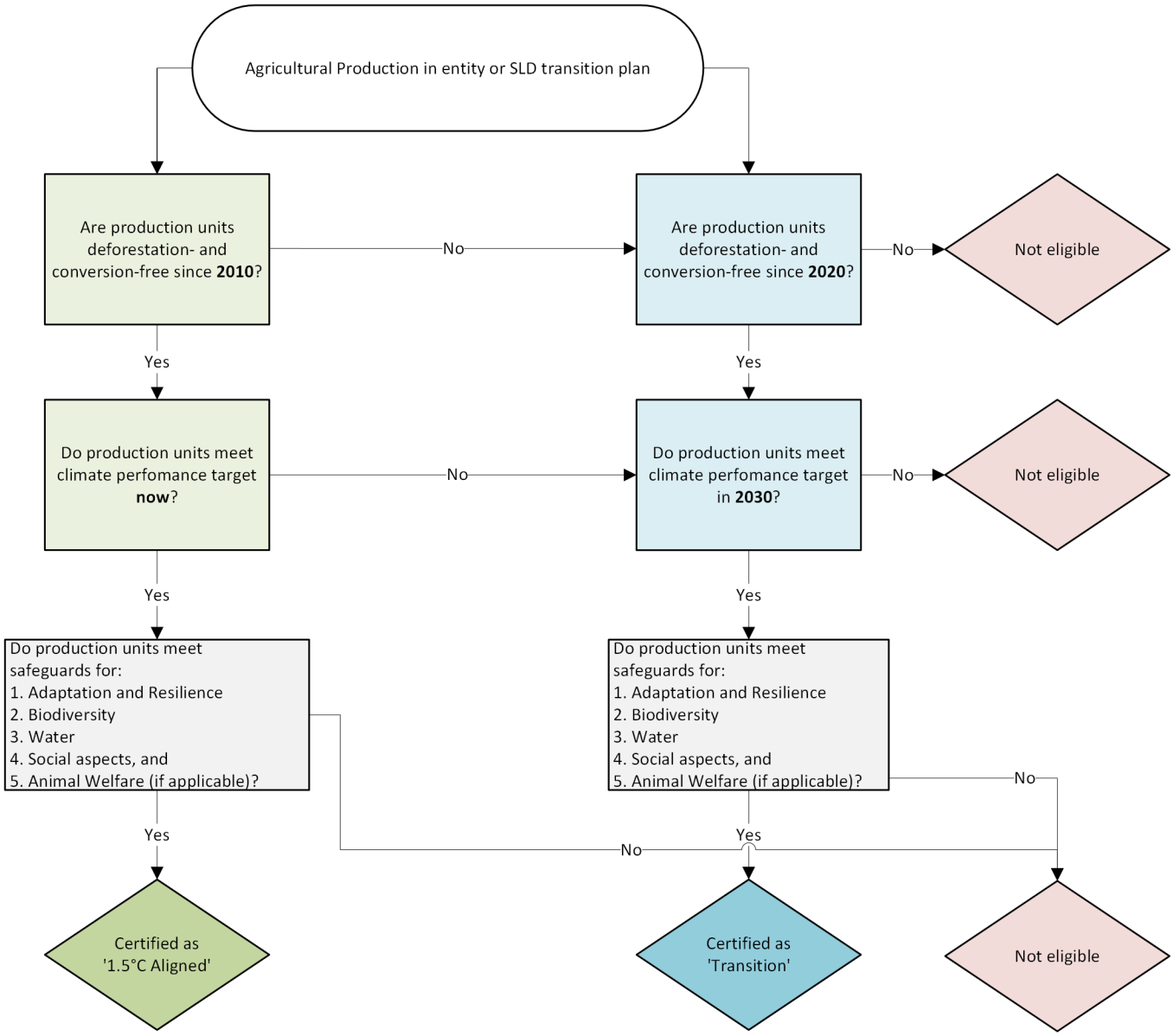


Figure 5. Flowchart of the Criteria for agriculture production Entity and SLD Certification.

4.1.1 Precondition: deforestation- and conversion-free agriculture production system

Any entity must fulfil this requirement and provide evidence of compliance as a precondition for Certification for all its production units.

Table 11. Entity and SLD Certification: precondition eligibility requirements.

Precondition: deforestation- and conversion-free agriculture production system		
Requirement for ´Aligned´ Entities	**Demonstration of compliance**	
Farmland that is part of the production unit(s) is free from deforestation and conversion of natural ecosystems since 31 Dec **2010**.	Geolocation of production units (polygon for units > 4 ha and single point for units < 4 ha).	To be verified compared to production unit land use status before 31 Dec **2010**.
Requirement for ´Transition´ Entities	**Demonstration of compliance**	
Farmland that is part of the production unit(s) is free from deforestation and	Geolocation of production units (polygon for units > 4 ha and single point for units < 4 ha).	To be verified compared to production unit land use status before 31 Dec **2020**.

conversion of natural ecosystems since 31 Dec **2020**.		

Entities labelled 'Transition' from the current moment until 2030 can be considered ´Aligned´ after 2030 if they have implemented a restoration plan for the land use changed within the entity boundary which occurred between 2010 and 2020. This restoration plan is required to follow the AFi guidance, as outlined in the Operational Guidance on Environmental Restoration and Compensation (2019). [68]The AFi guidance includes details about how a restoration plan should be constructed, including the issues to be considered, location of restoration activity, accountability of delivery, and verification processes.

Entities are expected to conduct or support restoration or compensation when they caused, contributed to, or assumed responsibility for deforestation or conversion that occurred since 2010. In the case of deforestation and conversion, fair and just remedy requires taking effective action to restore the given ecosystems and values to their prior condition and/or providing for the lost ecosystems and values. The restoration output should provide a like-for-like equivalence principle for restoration as a minimum and should be specific to the ecosystem converted, e.g., peatland converted post 2010 and pre-2020, then it should be peatland restoration that is in place to adhere to the like-for-like benefits.[69]

4.1.2 Scope of emissions and system boundaries for Entity Certification

These Criteria are for agriculture production entities (and their debt), i.e., farms comprising one or more production units, involved in the production of crops grown for human food and animal feed, livestock, and aquaculture products.

- All crops potentially grown for human food are included, but crops grown exclusively for non-food uses are excluded. Exclusions are therefore textile crops, crops used for construction (e.g., bamboo), rubber, tobacco, bioenergy crops with only non-food uses (e.g., miscanthus), and pharmaceutical crops.
- Meat products from all terrestrial animals are included, as are milk and eggs. Non-food animal products such as leather and wool are excluded.
- Farmed fish, molluscs, and crustaceans are included, but farmed seaweed or farmed marine mammals are currently excluded due to a lack of data. Captured fish are currently excluded from these Criteria as they require special safeguards to account for overfishing, the effects of trawling on the seabed, the effects of by-catch, amongst other environmental issues.

These Criteria focus on agrifood systems and thus entities producing non-food products are currently excluded from these guidelines (Table 12).

Table 12. Production systems included in the scope of these Criteria for Entity and SLD Certification.

Production system	Included	Excluded
Crops	Crops grown for direct or indirect human consumption e.g., grains, vegetables, feed crops.	Crops grown exclusively for non-food uses e.g., textiles, bamboo, rubber, tobacco, bioenergy crops.
Livestock	Animal food products from terrestrial animals e.g., meat, dairy, eggs.	Non-food animal products e.g., leather, wool.
Aquaculture	Farmed aquatic animal foods e.g., farmed fish, farmed molluscs, farmed crustaceans.	Farmed seaweed, farmed marine mammals, wild capture fish e.g., wild fish.

Emissions boundaries

All emissions from activities up to the farm gate are included, and carbon removals are accounted for at the entity level only, rather than the product level.

Considering the activity boundary (Figure 6), entity emissions to be included in climate performance targets (i.e., as in per emission pathway) are the following:

[68] AFi, (2019), Operational Guidance on Environmental Restoration and Compensation OG_Environmental_Restoration_Compensation-2020-52.pdf (accountability-framework.org)

[69] AFi, (2019), Operational Guidance on Environmental Restoration and Compensation OG_Environmental_Restoration_Compensation-2020-52.pdf (accountability-framework.org)

- Emissions from direct or statistically estimated land-use change (CO_2 from stock changes; N_2O and CH_4 emissions from natural vegetation burning; and CH_4, N_2O, and CO_2 emissions from peat soil burning).[70]
- Scope 1 emissions from all relevant activities and emission sources within the production unit:
    - CH_4 and direct and indirect N_2O emissions from livestock and manure management;
    - Direct and indirect N_2O emissions from N inputs to agricultural soils (except from N fixation and precipitation);
    - Non-biogenic CO_2 emissions from lime and urea;
    - CH_4 and N_2O emissions from rice cultivation;
    - CH_4 and N_2O emissions from biomass burning;
    - CH_4 and N_2O emissions from aquaculture ponds (as CH4 excreta and N2O excreta); and
    - CO_2, CH_4, and N_2O emissions related to on-farm energy production (including electricity) and fuel combustion (grouped as CO_2 -input, fuel burning, lime, urea).
- Scope 2 emissions related to purchased energy generation used at the production unit and scope 3 emissions related to purchased seed, saplings, fertilisers, pesticides, soil amendments (e.g., lime), machinery, fuel, and feed (see details below).

This follows the approach used by Poore and Nemecek (2018), which in turn primarily follows the system boundary in the World Food LCA Database.[71,72] This system boundary is consistent with the GHG Protocol Land Sector and Removals Guidelines when all key scope 2 and 3 emissions are included (see Figure 6). This system boundary was used as it allows usage of the Poore and Nemecek dataset to set the pathways and includes additional key emissions and activities that appear to be missing in GHG Protocol and the corresponding SBTi FLAG guidelines (see Box 3 below).

Included activities up to the farm gate (scope 2 and 3)

Activities before the farm stage (see Figure 6) which are included in the scope of activities (i.e., scope 2 and 3 emissions) are:

- Land-use change (direct land-use change ´dLUC´ or statistically measured land use change `sLUC´);[73]
- The manufacture of fertiliser, lime, pesticides, and other agricultural inputs;
- The manufacture of capital equipment;
- The manufacture of infrastructure e.g., greenhouses;
- The growing of seeds, saplings, and other similar inputs;
- The production and blending of animal feeds;
- The production of fuel off-farm;
- The production of electricity on- and off-farm;
- Irrigation water pumping (if the energy use for this occurs off-farm); and
- The transport of all inputs to the farm.

In livestock production systems (or mixed systems), food processing is included in the system boundary if the processing is of a food that creates a co-product or waste product which is then fed to animals. Feed blending and other types of feed processing are also included. However, processing of food for human uses after the farm gate is excluded.

[70] Emissions from these LUC activities are included in the scope but are assumed to be zero (as per DCF precondition).
[71] Poore, J. and Nemecek, T. (2018) 'Reducing food's environmental impacts through producers and consumers', Science, 360(6392), pp. 987–992. Available at: https://doi.org/10.1126/science.aaq0216.
[72] Nemecek Thomas *et al.* (2019) *Methodological Guidelines for the Life Cycle Inventory of Agricultural Products. Version 3.5, December 2019. World Food LCA Database (WFLDB). Quantis and Agroscope*. Lausanne and Zurich, Switzerland.
[73] These LUC activities are included in the scope but are assumed to be zero (as per DCF precondition).

Box 3. SBTi FLAG guidance and Climate Bonds Agriculture Production Criteria.

SBTi FLAG Alignment:

Products: SBTi FLAG include forestry products and textiles, which are excluded here.

Land-use change: SBTi FLAG allow the inclusion of soil carbon stock change in their commodity emission profiles, whereas all removals are accounted for at the entity level here.

System boundary: SBTi FLAG only include pre-farm non-land-based emissions related to fertiliser manufacture, whereas lime, pesticides, and capital equipment manufacture are included here. Lime can contribute up to a third of GHG emissions in some systems where acid soils are farmed and is generally included as an input in all datasets that SBTi FLAG refer to. Capital equipment can be a dominant source of impact for greenhouse crops and vineyards and is also included here. Where SBTi FLAG are ambiguous on whether non-land impacts related to producing animal feed are included, here they are included, with the assumption they are included in FLAG.

Emissions: SBTi FLAG only appear to account for CO_2 emissions related to land use change, whereas here, CH_4 and N_2O emissions from natural vegetation and peat soil burning are accounted for. SBTi FLAG do not appear to include direct CH_4 and N_2O emissions from aquaculture ponds, but these are accounted for here.

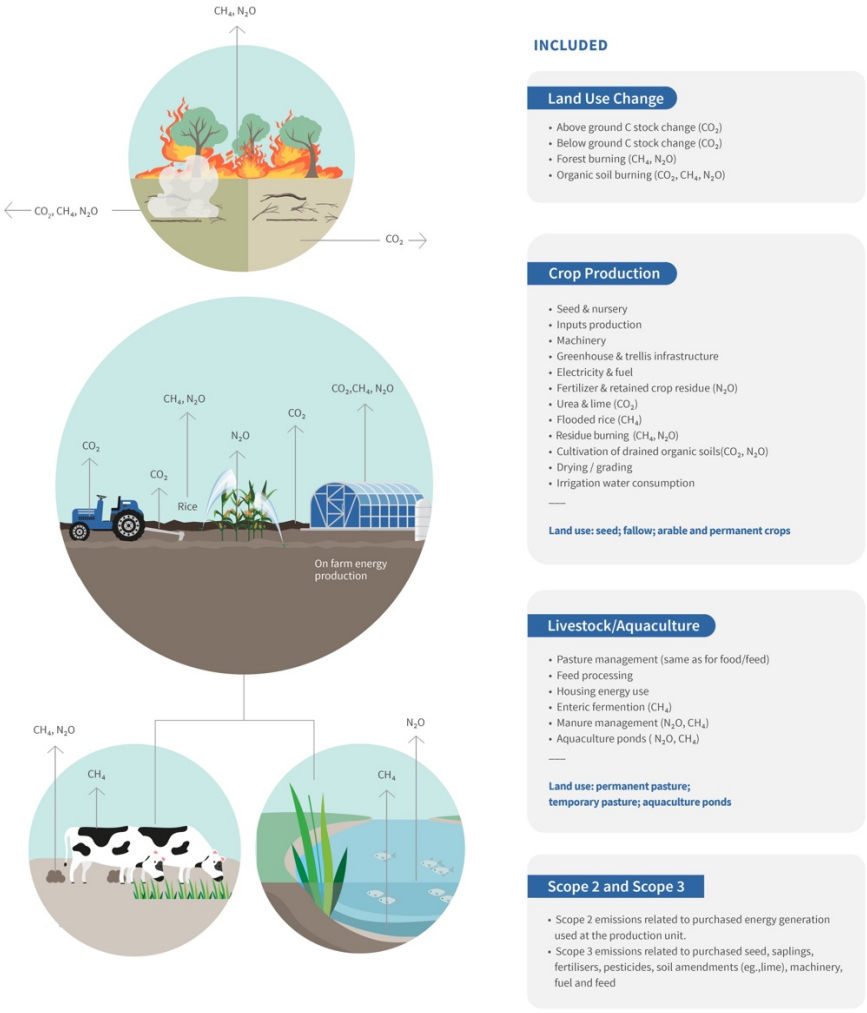


Figure 6. Activities in scope for emissions accounting in entity transition pathways.

4.1.3 Criteria for GHG emissions transition pathway for agriculture production

Certification at entity level (and for SLD instruments) requires a comprehensive accounting and assessment of GHG emissions from the various activities in the production unit(s) (within the scope explained above), which must comply with an emission pathway at the time of Certification and into the future.

Like all sectors, substantial emissions reductions need to be achieved in agriculture to achieve 1.5°C-aligned emissions. How fast and by when can be portrayed as a transition pathway, explained below.

The goal is to achieve net-zero GHG emissions by 2050. However, it is generally thought that reducing CH_4 and N_2O emissions from agriculture to zero or below will be technically challenging and prohibitively expensive using current technology.[74] In addition, agriculture is expected to be a source of negative CO_2 emissions, through reforestation of agricultural land, through increases in vegetative cover on farmland (e.g., agroforestry), and through increases in soil carbon stocks on cropland and pasture.

The Climate Bonds pathway for entities in agricultural production includes a GHG emission intensity per each agricultural commodity (i.e., kg CO_2eq per kilogram of product) from the current moment until 2050 at least, with a trajectory aligned to the goal of limiting global warming to 1.5°C.

This provides an annual reference point for GHG emissions intensity for each major agriculture commodity such that the intensity pathway calculated for each commodity can be scaled up to an entity level pathway by multiplying out the production of each commodity by the emissions intensities for each commodity.

The Climate Bonds pathway is based on the Poore and Nemecek database (2018) which contains emission data across approximately 40,000 farms globally for 43 key commodities covering around 90% of global food. These data are used to establish the Criteria thresholds of emission intensity per commodity at a given time. This offers the advantage that thresholds are based on real-world data rather than simulated data, and they better represent what producers can achieve in terms of emission intensity reductions. The system boundary of this study also aligns closely with the SBTi FLAG and GHG Protocol Land Sector and Removals boundary, and therefore supports its alignment with other guidelines. (Details on the rationale and methodology of the Climate Bonds pathway creation are in the Background Paper.)

Some entities (i.e., agricultural producers) may already perform below this pathway threshold today, while others will require substantial changes to get there. Equally, some farms are aligning their activities with such a transition and those that are doing so with a clear plan could potentially achieve Climate Bonds Certification.

To be able to certify as ´**Aligned**´ the eligible entity would need to meet the Climate Bonds pathway at the given annual reference point, with a value that is equal to or lower than the emission intensity for that annual reference, up until 2050.

Entities that are not currently aligned Certify as ´**Transition**´ if they have plans to meet the Climate Bonds pathway in 2030, with a value that is equal to or lower than the emission intensity threshold for that annual reference up until 2050.

Box 4. Example of how to meet the Agriculture Production Criteria 1.5°C transition pathway for agrifood entities (and their SLD).provides worked examples on how an entity (composed of production units producing wheat and maize) could meet the mitigation Criteria for 'Aligned' Certification by aligning with the Climate Bonds 1.5°C transition pathway from 2024, and how another entity (composed of production units producing only maize) could meet the mitigation Criteria for 'Transition' Certification by aligning with the Climate Bonds 1.5°C transition pathway by 2030.

[74] Intergovernmental Panel on Climate Change (IPCC) (ed.) (2023) Climate Change 2022 - Mitigation of Climate Change: Working Group III Contribution to the Sixth Assessment Report of the Intergovernmental Panel on Climate Change. 1st edn. Cambridge University Press. Available at: https://doi.org/10.1017/9781009157926.

Box 4. Example of how to meet the Agriculture Production Criteria 1.5°C transition pathway for agrifood entities (and their SLD).

Applicants for Entity Certification should meet the Climate Bonds Standard in addition to the rest of the Criteria requirements and safeguards explained in Table 10.

For the climate mitigation requirements.

- Time horizon targets: the climate mitigation performance targets cover the time from the date of Certification to the date the activity is intended to meet the 1.5°C transition pathway emissions, or 2050, whichever is sooner.
- Interim climate mitigation performance targets: the climate mitigation performance targets include interim targets on a three-yearly basis for the nine years following the date of Certification and a five-yearly basis thereafter over the full-time horizon.
- Alignment with the Agriculture Production Criteria transition pathway described in Section 4.1.3, where the climate mitigation performance targets are benchmarked against the transition pathway and align with it by 31 December 2030 at the latest.

Example: mitigation compliant 'Aligned'

An entity applying for Certification in 2024 with a mix of maize and wheat production (50% of production volume) with the following climate mitigation performance targets.

Climate mitigation performance targets for the entity's commodities (maize and wheat)						
Year	2024	2027	2030	2033	2038	2043
Average emission intensity (maize) ($kgCO_2eq/kg$ dry weight)	0.15	0.12	0.12	0.10	0.07	0.07
Average emission intensity (wheat) ($kgCO_2eq/kg$ dry weight)	0.18	0.15	0.15	0.12	0.10	0.10

Compared against the Climate Bonds Agriculture Production (maize) transition pathway:

Agriculture Production Criteria as in Climate Bonds transition pathway – maize and wheat transition pathways						
Year	2024	2027	2030	2033	2038	2043
Average emission intensity (maize) ($kgCO_2eq/kg$ dry weight)	0.15	0.13	0.12	0.11	0.09	0.07
Average emission intensity (wheat) ($kgCO_2eq/kg$ dry weight)	0.19	0.17	0.15	0.13	0.11	0.10

The entity's Certification tier is classified as '**Aligned'** because:

- at the time of Certification, the entity's average emission intensity for each commodity is equal to or lower than the Agriculture Production Criteria pathway values; and;
- remains aligned until the end of the Certification time horizon.

An annual verification report from an approved verifier is required to maintain the Certification.

Example: mitigation compliant 'Transition'

An entity applying for Certification in 2024 with the following climate mitigation performance targets.

Climate mitigation performance targets of the entity						
Year	2024	2027	2030	2033	2038	2043
Average emission intensity (maize) ($kgCO_2eq/kg$ dry weight)	0.18	0.15	0.12	0.10	0.07	0.07

Compared against the Climate Bonds Agriculture Production (maize) transition pathway:

Agriculture Production Criteria as in Climate Bonds transition pathway – maize transition pathway						
Year	2024	2027	2030	2033	2038	2043
Average emission intensity (maize) ($kgCO_2eq/kg$ dry weight)	0.15	0.13	0.12	0.12	0.08	0.06

The Entity Certification tier is classified as '**Transition'** because:

- at the time of Certification, the entity's average emission intensity is higher than the Agriculture Production Criteria pathway values; but;
- in 2030 the entity is aligned with the transition pathway; and,
- remains aligned until the end of the Certification time horizon.

An annual verification report from an approved verifier is required to maintain the Certification.

Handling cases where a pathway does not exist for a commodity

The available data are limited to 43 commodities. In the case that the entity seeking Certification produces commodities not available here, a suitable proxy should be chosen for the pathway e.g., the wheat pathway could proxy for triticale, or the lamb pathway could proxy for goat. The closest one in terms of production practices and emissions should be chosen, with justification of the chosen category provided.

Handling co-products

In the case of a co-product, economic allocation should be used to apportion environmental impacts to the co-product. For example, straw might be a co-product of wheat.

Detailed methodology and decisions taken in the process of establishing this pathway can be found in the Agriculture Production Background Document.

4.1.4 Excel tool for identifying Climate Bonds emission pathways for agrifood commodities in scope in the Agriculture Production Criteria

A Climate Bonds Excel tool is available with the full emission pathway for all 43 commodities covered in the dataset currently, where entities can find the annual emission target as CO_2eq for each given commodity (with disaggregated data by GHG gas for information). The Criteria requires alignment with the aggregated GHG pathway in CO_2eq, and not for each specific gas, to allow flexibility in how emission thresholds are met. However, the accounting and pathway of separated GHGs should be reported.

4.1.5 How to account for carbon removals at the entity level

Carbon removals should be accounted for at the entity (farm) level rather than the commodity product level. This is because there are currently no established protocols for allocating removals to each commodity (e.g., How should sequestration on farmland restored to forest be allocated to the different products produced on the farm? How should soil carbon sequestration be allocated to different crops in a rotation?). This rule is applied to all removals.

It is recommended that all entities are carbon neutral by 2050, where total emissions equal total removals, but recognise this may be impractical for many farms (e.g., where setting aside land for removals would substantially compromise productivity and thereby food supply, or where farms do not have substantial amounts of land to use for removals).

Therefore, a required pathway has been defined that is based on the hectares of cropland and pasture managed by the entity multiplied by the required sequestration per hectare of land under a 1.5°C pathway. This uses the SBTi FLAG removals pathway, which requires 0.4 tonnes of CO_2 to be sequestered per hectare of managed cropland and pasture per year until saturation point. This sequestration can be delivered through any mechanism that maintains the lands in a working and productive condition, including practices which increase soil carbon stocks, to biochar amendment, to agroforestry. The IPCC (2021) AR6 report identifies an economic mitigation potential of 0.82 tonnes of CO_2 sequestered per hectare (including in soil carbon, through biochar amendment, and agroforestry) implying the SBTi FLAG pathway is achievable, but may also be conservative.[75]

[75] in Figure 7.11 in Nabuurs, G-J., R. Mrabet, A. Abu Hatab, M. Bustamante, H. Clark, P. Havlík, J. House, C. Mbow, K.N. Ninan, A. Popp, S. Roe, B. Sohngen, S. Towprayoon, 2022: Agriculture, Forestry and Other Land Uses (AFOLU). In IPCC, 2022: *Climate Change 2022: Mitigation of Climate Change. Contribution of Working Group III to the Sixth Assessment Report of the Intergovernmental Panel on Climate Change* [P.R. Shukla, J. Skea, R. Slade, A. Al Khourdajie, R. van Diemen, D. McCollum, M. Pathak, S. Some, P. Vyas, R. Fradera, M. Belkacemi, A. Hasija, G. Lisboa, S. Luz, J. Malley, (eds.)]. Cambridge University Press, Cambridge, UK and New York, NY, USA. doi: 10.1017/9781009157926.009

Reducing the need to expand agricultural land, and sparing land from agriculture for carbon sequestration, are two of the most important levers to achieve 1.5°C (see, for example, Figure 7.11 of the IPCC (2021) AR6 report, or Figure 2.11 and 2.24 of the IPCC (2018) Global warming of 1.5°C report). Both levers require that the total area of agricultural land declines. Just how much agricultural land use has to decline depends on the 1.5°C-compatible scenario, but the 'middle-of-the-road' Scenario P3 (also called 'Scenario S2') includes an approximate 5% reduction in cropland for food and a 15% reduction in pastureland by 2050, with larger reductions required by 2100. Therefore, Climate Bonds also recommends that the entity includes a plan to reduce cropland area and pastureland area by 5% and 15%, respectively, by 2050, without compromising productivity, with the aim of making these lands available for carbon sequestering activities including BECCS and reforestation. This may become a requirement in future versions of these Criteria.

Carbon removals requirement:

> ***The applicant entity (or entity associated with the debt for SLD) must be removing 0.4 tonnes of CO_2 per hectare of 'working lands' (defined as cropland or pastureland which is in production, excluding field boundaries and hedgerows) per year to be on the 1.5°C pathway.***
>
> ***At the time of Certification, the entity must demonstrate an average carbon sequestration value of at least 0.4 tonnes of CO_2 per hectare per year in 'working lands' from the time of Certification until 2050 or until reaching an estimated carbon saturation levels for above and below carbon stocks. This carbon removal pathway can be incorporated into the Excel tool available to support Entity (and SLD) Certification.***

Carbon accounting must follow guidance from the GHG Protocol Land Sector and Removal Guidance.

4.2 Agriculture Production Criteria for Sustainability-Linked Debt Certification

Two levels of Sustainability-Linked Debt (SLD) Certification are available, depending on when the climate mitigation performance targets in the transition plan align with the Climate Bonds Standard Sector Criteria (see the Climate Bonds Standards and Box 2).

Table 13. Requirements for Sustainability-Linked Debt (SLD) Certification on two levels: 'Aligned' with the 1.5°C pathway for agriculture production and 'Transition' to the 1.5°C pathway for agriculture production.

SLD Tier	SLD Certification requirements
Tier 1: Aligned	1. Climate Mitigation Criteria • At the time of Certification, the entity can demonstrate that its agricultural production land to *which the debt is linked* is **deforestation- and conversion-free since 2010**, see Section 4.1.1., and • At the time of Certification, the average emissions intensity of the agriculture production units to which the **climate mitigation performance targets** *of the debt are linked* meet the sector-specific Criteria transition pathway, and continue to align thereafter through to 2050, see Section 4.1.2. • Removals at entity level. At the time of Certification, the entity can demonstrate that its agricultural production land to *which the debt is linked* meets the quantity of carbon sequestration required to align with the pathway at the entity level, see Section 4.1.5. 2. Adaptation and Resilience safeguard • The Certified entity meets the Adaptation and Resilience safeguard described in Section 5.1, which is reassessed and reconfirmed every five years. 3. Environmental and social safeguards • Biodiversity (Section 5.2), • Water (Section 0), • Social (Section 0), • Animal welfare (if applicable: only for livestock production units) (Section 5.5).
Tier 2: Transition	The Criteria are the same as for Level 1, except: • At the time of Certification, the entity can demonstrate that its agricultural production land to *which the debt is linked* is **deforestation- and conversion-free since 2020***, see Section 4.1.1., and • At the time of Certification, the average emissions intensity of the agriculture production units to which the **climate mitigation performance targets** of the debt are linked do not meet the sector-specific Criteria transition pathway, but its future climate mitigation performance targets align by 30 December **2030** and continue to align thereafter through to 2050 (see Section 4.1.1). **NOTE: After 2030, the entity can be Certified as 'Aligned' if it can demonstrate that a land restoration plan has been implemented on land deforested or converted between 2010 and 2020 which the debt is linked to.*

5 Safeguards

After assessing the requirements on climate Criteria (either on climate mitigation or adaptation for assets and UoP (Section 3) or on transition pathways for entities and SLD (Section 4)), eligible projects will need to check alignment with a set of safeguards on key indicators for environmental and social impacts:

1. Adaptation and Resilience (Section 5.1).
2. Biodiversity (Section 0).
3. Water (Section 5.3).
4. Social aspects (Section 5.4).
5. Animal welfare (if applicable, Section 5.5).

These safeguards aim to ensure eligible activities do not only benefit climate mitigation or adaptation, but also avoid risks of impacting on other key environmental and social aspects.

In particular, these safeguards ensure:

a) eligible projects minimise the risks of harming other aspects of sustainability beyond climate, and

b) eligible projects minimise the risks of harming the wider system into which they operate.

These safeguards work as a lighter set of requirements compared to climate performance criteria but nevertheless are requirements for obtaining Certification as green or climate-aligned projects.

Safeguards follow a common methodology for identifying and minimising risks of negative impacts (except for animal welfare). That is, a 4-step process requirement adapted to each of these key issues:[76]

1. Understanding and identifying the context: setting boundaries and interdependencies.
2. Identifying specific risks on the given environmental or social aspect.
3. Addressing and mitigating specific risks by undertaking risk-measures and adopting management plans aiming at;
    a. minimising direct risks from eligible projects, and
    b. minimising the risks of harming the defined system they operate within.
4. Undertaking of regular monitoring and (re)evaluation of the specific performance, adjusting to risk reduction measures over time as needed.

It is important to highlight these safeguards are not intended as a template for best practice but rather to provide a starting point for Certification applicants to take steps to assess and avoid unintended negative impacts of their projects and activities.

The animal welfare safeguard only applies to activities and/or production units with livestock production, and it does not follow the 4-step methodology (see Section 5.5).

5.1 Adaptation and Resilience safeguard

The aim of the Adaptation and Resilience safeguard is to ensure that the applicant production unit(s) and/or eligible activities are resilient and adapted to climate and can continue to produce agricultural commodities under future climate scenarios.

Climate Bonds proposes the following definition for Resilience: 'the capacity of economic, social or ecological assets or systems to resist, absorb, accommodate, adapt to, transform, and recover from the current and projected impacts of climate change, both direct and indirect, maintaining their basic structure and function'.

The Adaptation and Resilience (A&R) safeguard component of the eligibility Criteria will be fitted at the appropriate boundary to any applicant and financial tool, including assets, UoP, entities, and SLD.

To demonstrate compliance, the applicant must hold a risk assessment they have undergone or will undergo which includes the identified, planned, and implemented measures to manage and mitigate climate risks within the relevant production unit(s). Details on the specific steps and demonstration of compliance are given in Table 14.

[76] The 4-step process for risk assessment methodology is based on the Climate Bonds Resilience Principles and is adjusted to the other key environmental and social aspects required as safeguards. https://www.climatebonds.net/files/page/files/climate-resilience-principles-climate-bonds-initiative-20190917-.pdf

Table 14. Adaptation and Resilience safeguard: requirements and demonstration of compliance for any type of issuer.

	Steps for A&R Safeguard	Demonstration of compliance
1.	Identify boundaries and interdependencies.	The applicant must define the boundaries of the investment and associated assets and activities, as well as the internal and external interdependencies between the broader system affected by those assets and activities. These boundaries and interdependencies are important for scoping risks and benefits assessments, and ensuring the asset or activity being invested in is fit-for-purpose and does no harm to the system of which it is part. See checklist in Appendix 1.
2.	Assessment of the physical climate hazards.	The applicant must demonstrate that a risk assessment has been undertaken of the physical climate hazards to which the production unit(s) will be exposed and vulnerable over its operating life (applicable at the appropriate boundary to any applicant; asset or entity; and financial tool (including UoP and SLD). The applicant must follow best-practice standards or similar schemes to carry on the risk assessments, where the applicant can demonstrate the standard has sufficient requirements and thus is robust. See checklist in Appendix 1.
3.	Measures taken: a) Address and mitigate hazards. b) Ensure no harm to the resilience of system.	The applicant must also demonstrate that measures have or will be taken to: i. address and mitigate those identified physical climate hazards to a level so that the production unit is 'fit for purpose' in the face of coming climate change over its operational life; *and* ii. to ensure that the production unit does no harm to the resilience of the defined system it operates within, considering the boundaries and critical interdependencies between that system and the production unit. See checklist in Appendix 1.
4.	Ongoing monitoring and evaluation to adjust measures as necessary.	The applicant is required to demonstrate that there will be ongoing monitoring and evaluation of the relevance of the risks and resilience measures, and related project adjustments as needed. See checklist in Appendix 1.

The checklist (Appendix 1) is a tool to verify that the issuer has implemented sufficient processes and plans in the design, planning, and implementation phases of a project to ensure that the operation minimises risks. Additionally, that the project is appropriately adaptive and resilient to climate change, and supports the adaptation and resilience of other stakeholders in the environment.

All elements of the checklist must be addressed, and appropriate evidence provided that these requirements are being met or are not applicable in respect of the specific assets and projects linked to the financial instrument. It is expected that their evidence will encompass a range of assessment and impact reports, and associated data, including but not limited to those reports required to meet national and local licensing and approval processes. Appendix 2 includes detailed guidance for following the A&R Checklist.

5.2 Biodiversity safeguard

This biodiversity safeguard aims to ensure no significant harm to habitats and species diversity within the production unit(s) and into the wider landscape (system in which the eligible activities operate).

As with the other safeguards, the requirement is based on a 4-step-process of risk assessment and measures to minimise or mitigate those risks.

Table 15. Biodiversity Safeguard: requirements and demonstration of compliance for any type of issuer.

	Steps for Biodiversity Safeguard	Demonstration of compliance
1.	Identify boundaries and interdependencies with regards to biodiversity risks.	The applicant must define the boundaries of the investment and associated assets and activities, as well as the internal and external interdependencies between the broader system affected by those assets and activities. These boundaries and interdependencies are important for scoping risks and benefits assessments, and ensuring the asset or activity being invested in is fit-for-purpose and does no harm to the system of which it is part.
2.	Assessment of the risks on biodiversity.	The applicant must demonstrate that a biodiversity risk assessment has been undertaken on the potential impacts from the production unit(s) over its operating life (applicable at the appropriate boundary to any applicant and financial tool, including assets, UoP, entities and SLD). The applicant must follow best-practice standards or similar schemes to carry on the risk assessments, where the applicant can demonstrate the standard has sufficient requirements and thus is robust.
3.	Measures taken: a) Address and mitigate risks on biodiversity. b) Ensure no harm to biodiversity at the system (landscape level).	The applicant must also demonstrate that measures have or will be taken to: i. address and mitigate those identified biodiversity risks to a level so that the production unit is 'fit for purpose' over its operational life; *and* ii. to ensure that the production unit does no harm the biodiversity of the defined system it operates within, considering the boundaries and critical interdependencies between that system and the production unit.
4.	Ongoing monitoring and evaluation to adjust measures as necessary.	The applicant is required to demonstrate that there will be ongoing monitoring and evaluation of the relevance of the biodiversity risks and measures, and related project adjustments as needed.

These biodiversity **critical interdependencies** at a minimum, should be considered in terms of the production unit(s) and/or eligible activities to potentially 'do harm' to the system it operates within:[77]

1. Introduction of pests and diseases.
2. Reduction in pollinating insects and birds.
3. Reduction in biodiversity of critical habitat(s).[78]
4. Consideration of relationship of operations with potential extinction risk for endangered species.

[77] This list is non-exhaustive and for certain geographies the importance of specific interdependencies may differ, therefore some flexibility can be applied in the structure of the consideration evidence being given.

[78] Critical habitats as defined in IFC PS6 (2012), Performance Standard 6: Biodiversity Conservation and Sustainable Management of Living Natural Resources | International Finance Corporation (IFC) , p. 4.

5. Overuse of inputs, including pesticides, herbicides, veterinary products and others.
6. Use of chemicals listed in the Stockholm Convention, or (1a) or (1b) in the WHO classification of pesticides by hazard, or not in compliance with the Rotterdam Convention is not allowed in eligible activities or projects.[79,80,81]

Assessment and measures: Issuers can utilise existing market guidance such as the Science-based Targets for Nature (SBTN) and Taskforce for Nature-Related Financial Disclosures (TNFD) and/or IFC Performance Standard 6 for steps and metrics on how to apply steps 2 (risks) and 3 (measures) of this biodiversity safeguard.

The following sources are **recommended** by Climate Bonds as credible and effective sources for meeting the biodiversity safeguard. The sources can provide guidance in doing no significant harm for biodiversity and highlighting potential measures which could be undertaken by agriculture producers to be beneficial in providing potential biodiversity gains. It should be noted that the list is non-exhaustive, and it may be that there is equally appropriate biodiversity guidance that could be leveraged by those in crop and livestock production which should be cited in submissions.

TNFD Draft Food and Agriculture Sector Guidance (2023)[82] provides comprehensive guidance on metrics and approaches that can be incorporated into corporate strategy and disclosures. The key components of the guidance includes:

- how agrifood business activities are related to impacts on biodiversity,[83]
- guidance and resources to identify interdependencies, risks and opportunities related to biodiversity and agricultural production processes,[84,85]
- potential agrifood sector responses for biodiversity-focused measures and disclosure metrics for evidence of progress against stated actions over time.[86]

Examples of risks and responses focused on biodiversity from TNFD are summarised in Table 16.

Table 16. Example of common identified risks to biodiversity and potential response options (Source: Climate Bonds own elaboration based on TNFD analysis (2023).

Risk to biodiversity	Biodiversity measure / response option (as in TNFD, 2023)
Nitrogen and phosphorus surpluses	• Create a soil management plan that identifies main threats to soil health, describes soil management practices used and outlines an approach to input optimisation, including the use of fertilisers. *GRI 13 (2022).* • Establish a plan with time-bound targets to reduce excess fertiliser use-intensity per fertiliser nutrient type (N, P_2O_5, K_2O) with an open methodology for the specific production system. *FAO (2021); related to GBF target 7.* • Invest in precision technologies to increase nutrient use-efficiency and decrease runoff and eutrophication, as well as technologies for nutrient recycling and organic fertilisers. *TNFD.*
Pesticide[87]	• Invest in pesticide efficiency technologies and environmentally-friendly pest control. FAO (2021). • Develop and adhere to an integrated pest management plan, in line with best practices from the International Code of Conduct on Pesticide Management, to prevent, mitigate and remediate negative impacts associated with the use of hazardous pesticides and excess pesticide use. FAO (2021).

[79] UNEP, (2019) Stockholm Convention http://www.pops.int/

[80] WHO, (2019), The WHO Recommended Classification of Pesticides by Hazard and guidelines to classification, 2019 edition

[81] Rotterdam Convention, (2019), Text of the Convention (pic.int)

[82] TNFD (2023) Draft sector guidance - Food and agriculture – TNFD

[83] TNFD, (2023), Draft sector guidance - Food and agriculture – TNFD p. 17-21.

[84] Ibid., p. 23-33.

[85] Ibid., p. 36-39.

[86] Ibdi., p. 46-57. Annex 1.

[87] Organisations can use pesticide sales numbers per crop type to create an initial estimate until location-specific data are available (TNFD 2023).

Risk to biodiversity	Biodiversity measure / response option (as in TNFD, 2023)
(including risk on pollination services for the production unit(s))[88]	
Plastic leakage	• Invest in plastic recycling technologies and infrastructure and plastic reuse solutions.
Air pollution	• Create a plan with time-bound targets to reduce non-GHG emissions to air, including NO_x, SO_x, NH_3 and NMVOCs. GRI 13 (2021).
On-farm nature management	• Invest in rewilding initiatives, such as natural vegetation in cropped landscapes, rewilding, flower strips, and tree cover on crop land. TNFD. • Make investments in breed and crops at risk of extinction, indigenous crops, and in an increased number of crop varieties (genetic varieties), related to GBF Goal A. • Implement strategies to manage the use of genetically modified organisms (GMOs). SASB: Agricultural Products Standard (2018).

Other examples of relevant guidance for demonstration of compliance with the biodiversity safeguard, including SBTN (2023), UNEP (2023) and IFC (2012) can be found in Appendix 3.

5.3 Water safeguard

The water safeguard aims to ensure no significant negative effect on water use and quality derives from the eligible activities within the production unit(s) and/or into the wider landscape (system in which the eligible activities operate).

As with the other safeguards, the requirement is based on a 4-step process of risk assessment and measures to minimise or mitigate those risks. Specific requirements are presented in Table 17.

[88] Organisations can use pollination dependency ratings for crop categories to classify procured or produced crops into groups of those with a moderate, high or essential dependence on pollinators (see Annex 3). Thereafter, organisations can estimate the size of the dependency by the quantity of the crops procured. (TNFD 2023).

Table 17. Water safeguard: requirements and demonstration of compliance for any type of issuer.

	Steps for Water safeguard	Demonstration of compliance
1.	Identify boundaries and interdependencies with regards to water use and water quality risks.	The applicant must define the boundaries of the investment and associated assets and activities, as well as the internal and external interdependencies between the broader system affected by those assets and activities. These boundaries and interdependencies are important for scoping risks and benefits assessments, and ensuring the asset or activity being invested in is fit-for-purpose and does no harm to the system of which it is part.
2.	Assessment of the risks on water	The applicant must demonstrate that a risk assessment on water use and water quality has been undertaken on the potential impacts from the production unit(s) over its operating life (applicable at the appropriate boundary to any applicant (asset or entity) and financial tool, including UoP and SLD). The applicant must follow best-practice standards or similar schemes to carry on the risk assessments, where the applicant can demonstrate the standard has sufficient requirements and thus is robust.
3.	Measures taken: a) Address and mitigate risks on water use and quality. b) Ensure no harm to water availability and water quality at the system (landscape level).	The applicant must also demonstrate that measures have or will be taken to: i. address and mitigate identified water risks to a level so that the production unit is 'fit for purpose' over its operational life; *and* ii. ensure that the production unit does no harm to the water availability and water quality of the defined system it operates within, considering the boundaries and critical interdependencies between that system and the production unit. A water management plan must demonstrate risks are addressed and mitigated. This plan must include qualitative or quantitative evidence that gives a description of existing or planned steps taken to ensure risks and interdependencies are addressed.
4.	Ongoing monitoring and evaluation to adjust measures as necessary.	The applicant is required to demonstrate that there will be ongoing monitoring and evaluation of the relevance of the water-related risks and measures and related project adjustments as needed, within a water management plan. For Entity and SLD Certification, annual verifications need to demonstrate that the water-related risks are being monitored and where appropriate acted upon.

Water use and water quality **critical interdependencies**, at a minimum, should be considered in terms of the production unit(s) and/or eligible activities to potentially 'do harm' to the system it operates within:[89]

1. The effects of water use or pollution on other water users or erosion in the watershed.
2. Relationships of the production unit(s) eligible activities to nearby flood zones.

[89] This list is non-exhaustive and for certain geographies the importance of specific interdependencies may differ, therefore some flexibility can be applied in the structure of the consideration evidence being given.

3. Increased risk of flooding in the production unit(s) or wider landscape.
4. Water-related risks to be considered:
    a. Precipitation; high precipitation, intense rainfall events, waterlogging, flood, drought, freezing rain (hail, ice).
    b. Water stress; crop water stress (reflecting a combination of temperature, precipitation, and wind), ratio of water withdrawals to availability.
    c. Sea-level; inundation, flooding or storm surges, salinisation due to saltwater intrusion or changing water regimes.
    d. Glacial melting and lake outbursts; flood, body of water contained by glacier overflows or glacial melts.

For guidance, issuers can follow the recommendations provided by TNFD (2023) regarding freshwater use in their eligible activities. '*Organisations can use the list of crops with a high freshwater dependency identified in E2 and overlay detailed location data on the catchment area of each crop category, using spatial maps of current levels of water stress to estimate the size of the dependency. Organisations can use data sources such as the open source Aqueduct Food Platform to access water stress spatial maps and water risk scores per crop per catchment area.'*[90]

These interdependences and risks should be considered and assessed to produce a water management plan (including internal strategy, policy and/or objectives) with clear steps taken to ensure negative impacts are minimised, and risks mitigated with appropriate sustainable measures.

Existing market guidance should be used, such as the Science-based Targets for Nature (SBTN) and Taskforce for Nature-Related Financial Disclosures (TNFD) for steps and metrics on how to consider such water-related issues.

5.4 Social safeguard

The social safeguard aims to ensure no significant negative effect on livelihoods and human wellbeing derives from the eligible activities within the production unit(s) and/or into the wider landscape (system in which the eligible activities operate).

The social safeguard requires that issuers meet **three minimum pre-conditions** for all eligible Certifications (detailed list and requirements are given in Table 18):

1. formally adhere to **international labour conventions**,
2. provide an annual statement on steps taken to **ensure no modern slavery, child labour or human trafficking** has occurred through the business activities, and
3. where appropriate follow guidance with **respect to indigenous peoples and the rights of local communities**.

As with the other safeguards, there are additional requirements based on a 4-step process of risk assessments and measures to minimise or mitigate those risks, with specific requirements presented in Table 18.

[90] TNFD (2023) *Taskforce on Nature-related Financial Disclosures. Additional Sector Guidance Food and Agriculture to TNFD's Guidance on assessment of nature-related issues— the LEAP approach.* Available at: https://tnfd.global/

Table 18. Minimum social safeguards preconditions that should be demonstrated for any Certification of eligible activities.

Preconditions on Social Safeguard	International labour conventions that need to be adhered to and formally recognised	Details/Reference
1. **International labour conventions.**	ILO Declaration on the Fundamental Principles and Rights at Work and Social Policy; and the ILO Tripartite.	Fundamental principles and rights at work:[91] ● freedom of association and the effective recognition of the right to collective bargaining, ● the elimination of all forms of forced or compulsory labour, ● the effective abolition of child labour, and ● the elimination of discrimination in respect of employment and occupation.
2. **Ensure no modern slavery, child labour or human trafficking.**	UN Guiding Principles on Business and Human Rights	Business & Human Rights Resource Centre. (2019). UN Guiding Principles. www.business-humanrights.org/en/un-guiding-principles Provide a slavery and human trafficking statement with steps taken to ensure modern slavery is not taking place.[92]
3. **Respect to indigenous peoples and the rights of local communities.**	Free, prior, and informed consent (FPIC)	AFi best practice in securing the free, prior, and informed consent (FPIC) of indigenous peoples and local communities.[93] IFC Performance Standard 7 on Indigenous peoples.[94] The applicant is required to ensure no violation of land, cultural, and natural resource rights of indigenous peoples and local communities (IPLCs).

[91] https://www.ilo.org/global/standards/introduction-to-international-labour-standards/conventions-and-recommendations/lang--en/index.htm
[92] As example of guidance, the UK Modern Slavery Pact can be used: HM Government, (2015), Modern Slavery Act 2015 (legislation.gov.uk)
[93] Accountability Framework Initiative. Operational Guidance: Free Prior and Informed Consent (2020)
[94] IFC Performance Standard 7 (2012), Performance Standard 7: Indigenous Peoples | International Finance Corporation (IFC)

Table 19. Social safeguard: requirements and demonstration of compliance for any type of issuer.

	Steps for Social Safeguard	Demonstration of compliance
1.	Identify boundaries and interdependencies with regards to social risks (people´s livelihoods).	The applicant must define the boundaries of the investment and associated assets and activities, as well as the internal and external interdependencies between the broader system affected by those assets and activities. These boundaries and interdependencies are important for scoping risks and benefits assessments, and ensuring the asset or activity being invested in is fit-for-purpose and does no harm to the system of which it is part. With regards to social aspects, including, but not limited to: modern slavery statement, labour standards, indigenous peoples and local community rights, human rights, and livelihoods.
2.	Assessment of the risks on social aspects.	The applicant must demonstrate that a risk assessment on social aspects has been undertaken on the potential impacts from the production unit(s) over its operating life (applicable at the appropriate boundary to any applicant and financial tool, including assets, UoP, entities and SLD). The applicant must follow best-practice standards or similar schemes to carry on the risk assessments, where the applicant can demonstrate the standard has sufficient requirements and thus is robust.
3.	Measures taken to: a) Address and mitigate risks on social aspects. b) Ensure no harm to social aspects at the system (landscape level).	The applicant must also demonstrate that measures have or will be taken to: i. address and mitigate identified social risks to a level so that the production unit is 'fit for purpose' over its operational life; and ii. ensure that the production unit does no harm to the social aspects/people´s livelihoods of the defined system it operates within, considering the boundaries and critical interdependencies between that system and the production unit(s).
4.	Ongoing monitoring and evaluation to adjust measures as necessary.	The applicant is required to demonstrate that there will be ongoing monitoring and evaluation of the relevance of the water-related risks and measures and related project adjustments as needed, within a water management plan. For Entity and SLD certification, annual verifications need to demonstrate that the social risks are being monitored and where appropriate acted upon.

Regarding **entity transition plans and SLD:** they are required to demonstrate **social policies and/or qualitative evidence of inclusion of social aspects into business transition plans in addition to environmental targets**. The social aspect included in the transition plan must include **commitments and an enabling environment** to, at a minimum, aim at the following goals:

- Integrate human rights and labour standards (including the list above).
- Address social risks and opportunities.
- Ensure meaningful participation and partnership.
- Promote gender equality.

Demonstration of compliance for Entity and SLD certification should be in the form of qualitative or quantitative evidence that ensures that these social considerations are integrated in the development of the business transition strategy, with sufficient reporting and assessment of performance over time.

Additional resources on guidance to meet the social safeguard is given in Appendix 4.

5.5 Animal welfare safeguard

Issuers are required to obtain certification to schemes that require sufficient high standards of animal welfare. The following schemes have been selected as suitable for this purpose:

- Humane Farm Animal Care Certified Humane https://certifiedhumane.org
- RSPCA Assured www.rspcaassured.org.uk/farm-animal-welfare/rspca-welfare-standards
- Animal Welfare Approved by A Greener World https://agreenerworld.org/certifications/animal-welfareapproved
- Beter Leven levels 2&3 https://beterleven.dierenbescherming.nl
- G.A.P Steps 4 and above for cattle are acceptable. All levels are acceptable for other species. https://globalanimalpartnership.org

If the issuer demonstrates that none of these schemes certify in the country where the operations are located, then assessment should be undertaken using the requirements (principles and the relevant species-specific mitigation criteria) detailed in the FARMS Initiative Responsible Minimum Standards (RMS),[95] except those criteria relating to transportation and slaughter as these are out of the scope of these agriculture criteria. These are available at farmsinitiative.org.

In extensive agriculture systems, welfare considerations still apply. However, if not readily available, there is **no burden of proof required for extensive agricultural systems** to demonstrate animal welfare standards certification, although it is expected that welfare standards would still apply e.g., no dehorning, disbudding at the earliest possible age and with extensive pain relief.

Acknowledgement: Climate Bonds would like to thank the contribution of the FARMS Initiative for their guidance and input for the animal welfare requirements in this criteria update. Specifically, Peter Stevenson OBE, Jackie Groberski, CFA, and Emily Randall for their contribution on this animal welfare safeguard.

[95] https://www.farmsinitiative.org/

6 Definitions

Adaptation and Resilience Criteria: Rules or principles for evaluating and preventing physical climate risk, as well as assessing and reducing the vulnerability of an asset or entities to the effects of climate changes. These rules generally guarantee that the activities do not do any significant harm to other assets within their system boundaries covering the area affected by the activity.

Applicant: The term or name for any potential bond issuer, or non-financial corporate entity that might seek Certification under the Agriculture Production Criteria.

Certified entity: The entity or part thereof which is being certified under the Climate Bonds Standard. Currently, Entity Certification is limited to non-financial entities or segregated segments thereof, for which the Climate Bonds has Climate Bonds Standard Sector Criteria for Entity Certification.

Climate Bond Certification: allows the applicant to use the Climate Bond Certification mark in relation to that bond. Climate Bond Certification is provided once the independent CBSB is satisfied the bond complies with the CBS.

Climate Bonds Initiative (Climate Bonds): An investor-focused not-for-profit organisation, promoting large-scale investments that will deliver a global low-carbon and climate resilient economy. Climate Bonds seeks to develop mechanisms to better align the interests of investors, industry, and government to catalyse investments at a speed and scale sufficient to avoid dangerous climate change.

Climate Bonds Standard (CBS): A screening tool for investors and governments that allows them to identify green bonds, the proceeds of which are being used to deliver climate change solutions. This may be through climate mitigation impact and/or climate adaptation or resilience. The CBS is made up of two parts: the parent standard (CBS v4.2) and a suite of sector-specific eligibility Criteria. The parent standard covers the Certification process and pre-and post-issuance requirements for all Certified bonds, regardless of the nature of the capital projects. The Sector Criteria detail specific requirements for assets identified as falling under that specific sector. The latest version of the CBS is published on the Climate Bonds website.

Climate Bonds Standard Board (CBSB): A board of independent members that collectively represents $34 trillion of assets under management. The CBSB is responsible for authorising (i) revisions to the CBS, including the adoption of additional Sector Criteria; (ii) approved verifiers; and (iii) applications for Certification of a bond under the CBS. The CBSB is constituted, appointed, and supported in line with the governance arrangements and processes as published on the Climate Bonds website.

Climate change: A change in global or regional climate patterns attributed to the increased levels of CO_2 in the atmosphere, produced mainly by the combustion of fossil fuels.

Climate goals: Objectives that aim to reduce GHG emissions to limit the global temperature increase to 1.5°C above pre-industrial levels.

Climate mitigation performance targets: The performance targets that define the measurable climate mitigation performance to be achieved.

Climate adaptation and resilience: Measures or assessments related to protecting communities or ecosystems from the effects of climate change. Adaptation refers to protection, while resilience is the ability to adapt and recover from the impacts of climate change.

Climate targets: Limits established by scientists and policymakers in plans to combat climate change.

CO_2 equivalent: A unit to measure the effect of all greenhouse gases according to their global warming potential that expresses the warming effect of each greenhouse gas over a set period of time (usually 100 years) in comparison to CO_2. Thus, an amount of a GHG can be expressed by the quantity of CO_2 that will have the equivalent warming effect over 100 years.

Critical interdependencies: The asset or activity's boundaries and interdependencies with surrounding infrastructure systems. Interdependencies are specific to local context but are often connected to wider systems through complex relationships that depend on factors 'outside the asset fence' that could cause cascading failures or contribute to collateral system benefits.

Decarbonisation pathways: Transformation processes, strategies, or indications to be implemented in the energy sector aiming to reduce emissions and the use of fossil fuels. They involve measures such as shifting the energy mix, increasing energy efficiency, utilising the circular economy, or managing demand for energy.

Decarbonise: Move away from energy systems that produce carbon dioxide and other greenhouse gas emissions and remove the amount of carbon gaseous compounds in the atmosphere.

Emerging economies: All other countries not included in the advanced economies regional grouping.

Emission intensity: Volume of emissions per unit of a representative factor in the assessed sector, which in the agriculture production sector is kg of production or equivalent functional unit, so the emissions intensity is the grams of CO_2 eq per kg of food generated: gCO_2/kg.

Emissions target: Limits that scientists set for the quantity of emissions to be aligned with the Paris Climate Agreement.

Green bond: A bond where the proceeds are allocated to environmental projects or expenditures. The term generally refers to bonds that have been marketed as green. In theory, green bonds proceeds could be used for a wide variety of environmental projects or expenditures, but in practice they have generally been earmarked for climate change projects.

Industry working Group (IWG): A group of key organisations that are potential applicants, verifiers and investors convened by Climate Bonds. The IWG provides feedback on the draft Sector Criteria developed by the technical working group (TWG) before they are released for public consultation.

Investment period: The interval between the bond's issuance and its maturity date; otherwise known as the bond tenor.

IPCC: The Intergovernmental Panel on Climate Change (IPCC) is the United Nations body for assessing the science related to climate change.

Life-cycle emissions analysis: A methodology for assessing or accounting for environmental emissions associated with all the stages of the life cycle of a product or process, from the initial design phase to disposal or recycling.

Low-carbon technologies: Technologies referred to as innovative technical solutions that are characterised by a low-emission intensity, compared to state-of-the-art alternatives. Considered best-in-class technologies with a focus on environmental impact, examples of electricity utility low-carbon technologies would be solar, wind, marine, bioenergy, hydropower, geothermal, and nuclear.

Mitigation Criteria: Rules and principles containing thresholds, benchmarks, and milestones for sector activities whose objective is the reduction of the harmful effects of greenhouse gases emissions.

Mitigation technologies: Actions within technological processes implemented to reduce and curb greenhouse gas emissions.

Negative emissions: Processes in which more CO_2 is removed and stored from the atmosphere than added to it, so the final GHG emissions balance is negative. It can be achieved by natural processes or a variety of technological solutions. Negative emissions are necessary to meet the Paris Agreement.

Net-zero emissions scenario (NZE): A science-based scenario designed to show what is needed across the main sectors by various actors, and by when, for the world to achieve net-zero energy-related and industrial process CO_2 emissions by 2050. It also aims to minimise methane emissions for the energy sector.

Net-zero emissions: A situation where global greenhouse gas emissions from human activity are in balance with emissions reductions. To achieve this situation, human-caused emissions should be reduced as close to zero as possible.

Net-zero targets: Global policy instruments for international GHG reductions to achieve net-zero emissions.

Offsetting: A climate action that enables organisations to compensate for the emissions they put into the atmosphere, by supporting projects that reduce emissions in other regions of the world.

Parent company/group: A company is considered a parent company of another entity (a subsidiary) if it exercises control over the subsidiary. The terms control and subsidiary have the meaning assigned to them under International Financial Reporting Standard 10 (IFRS 10). A parent group consists of the parent company and all the companies that the parent company exercises control over. Where the applicant does not belong to a group of companies, the term parent company applies to the applicant.

Paris Agreement: A legally binding international treaty on climate change adopted by 196 parties. Its overarching goal is to hold the increase in the global average temperature to well below 2°C above pre-industrial levels and pursue efforts to limit the temperature increase to 1.5°C above pre-industrial levels.

Pathways: Science-based trajectories for different sectors indicating the way to achieve targets related to relevant indicators.

Scenarios: Science-based plausible descriptions of how the future may unfold, based on several assumptions (economic, social, behavioural, technological), which generally form part of a set of alternative pathways. Examples are the IEA net-zero emissions scenario and the NDC scenario.

Scope of emissions: Scope 1, 2 and 3 are terms devised by the GHG Protocol to categorise the different sources of carbon emissions an organisation creates in its own operations, and in its wider value chain.

Standards Criteria: Established principles to evaluate processes, assets, or entities aiming to achieve benchmarks, targets, or goals.

Sustainability-linked debt (SLD): Any debt instrument for which the financial and structural characteristics can vary depending on whether the issuer achieves predefined sustainability/ESG objectives. Such objectives are measured through predefined key performance indicators (KPIs) and assessed against predefined performance targets. Proceeds of SLD are intended to be used for general purposes.

Technical working group (TWG): A group of recognised experts from academia, international agencies, industry, and NGOs convened by Climate Bonds. The TWG develops the Sector Criteria, which are detailed technical criteria for the eligibility of projects and assets as well as guidance on the tracking of eligibility status during the term of the bond. Their draft recommendations are refined through engagement with finance industry experts in convened industry working groups (IWG) and through public consultation. Final approval of Sector Criteria is given by the CBSB.

Transition targets: Thresholds, benchmarks, and milestones based on key assumptions and dependencies used by scientists and policymakers to develop a plan to achieve climate targets.

7 Acronyms

CAPEX	Capital expenditures
CBS	Climate Bonds Standard
CBSB	Climate Bonds Standard Board
CO_2	Carbon dioxide
EU	European Union
GHG	Greenhouse gases
IFC	International Finance Corporation
IPPC	Intergovernmental Panel on Climate Change
IWG	Industry working group
KPI	Key performance indicator
LCA	Life cycle assessment
RTRS	Round Table of Responsible Soy Association
SBTi	Science Based Targets initiative
SLB	Sustainability-linked bond
SLD	Sustainability-linked debt
TWG	Technical working group
UoP	Use of proceeds

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Appendix 1: Adaptation and Resilience checklist for relevant production unit(s)

This Adaptation and Resilience (A&R) checklist applies to the applicant of either assets, UoPs, entities and SLDs, which previously would need to define the boundary of its production unit(s) linked to the given financial instruments. For entities and SLDs, this is required for the entire production unit(s). (This checklist is adapted from Climate Bonds Agriculture Production Criteria, 2021.)

Adaptation and Resilience checklist for relevant agricultural production unit(s)		
1. Clear boundaries and critical interdependencies between the agricultural production unit(s) and the system they operate within are identified.		
1.1	Boundaries of the production unit(s) are defined using (1) a listing of all farm holdings and associated assets and activities associated with the use of the asset, bond proceeds or entity/SLD (as appropriate), (2) a map of their location, and (3) identification of the expected operational life of the activity, asset, proceeds, or entity/SLD.	
1.2	Critical interdependencies between the production unit(s) and the system within they operate are identified. Identification of these interdependencies should consider the potential for adverse impacts arising from the list given in Item 1 of Appendix 2.	
2. An assessment has been undertaken to identify the key physical climate hazards to which the production unit(s) will be exposed and vulnerable over their operating life.		
2.1	Key physical climate risks and indicators of these risks are identified in line with the following guidelines: ● Risks are identified based on (a) a range of climate hazards, and (b) information about risks in the current local context, including reference to any previously identified relevant hazard zones, e.g., flood zones. (Item 2 in Appendix 2) ● A full list of potential physical climate risks that may be considered is given in Item 3 of Appendix 2. ● At a minimum, risks in each of the categories in Item 2 of Appendix 2 must be considered.	
3. The measures that have been or will be taken to address those risks mitigate them to a level so that the production unit(s) is able to manage changing climatic conditions over its operational life.		
3.1	Risk reduction measures are implemented for all key risks to the production unit(s). These should enable the production unit(s) to meet an average annual productivity threshold under a range of expected climate hazards for the duration of the investment period. The minimum productivity threshold is determined by the average level of yield loss, compared to average production over five years, for at least three comparable holdings with five years or more of production. Where comparable holdings are not available, the minimum productivity threshold will be calculated as 10% less than the mean annual productivity over five previous years where no extreme climate events occurred (Item 4 in Appendix 2).	
3.2	Risk reduction measures must be tolerant to a range of climate hazards and not lock in conditions that could result in maladaptation.	
4. The measures that have been or will be taken do no harm to the resilience of the defined system they operate within, as indicated by the boundaries of and critical interdependencies within that system, as identified in Item 1 in this checklist.		
4.1	An assessment is conducted to demonstrate that the production unit(s) do not pose significant risk of harm to others; natural, social, or financial assets according to the principle of best available evidence during the investment period considering the production unit's boundaries and critical interdependencies as defined in Item 1 of this checklist (Item 5 of Appendix 2). Harm is defined as an adverse effect on any of the items in Item 6 of Appendix 2.	
	If the intervention relates to hard infrastructure, the infrastructure is suitable to climate change conditions over its operational life. The infrastructure must be tolerant to the range of climate hazards identified in Item 2 of this checklist and not lock in conditions that could result in maladaptation.	
5. The applicant is required to demonstrate that there will be ongoing monitoring and evaluation of the relevance of the risks and resilience measures, and related adjustments to those measures will be taken as needed.		
5.1	Indicators for risks identified under Item 2 in this checklist are provided.	
5.2	Indicators for resilience measures identified under Item 3 in this checklist are provided.	
5.3	Indicators for 'no harm' to relevant system assets identified under item 4 in this checklist are provided.	

Adaptation and Resilience checklist for relevant agricultural production unit(s)		
5.4	The applicant has a viable plan to annually monitor (a) climate risks linked to the production unit, (b) climate resilience performance, and (c) appropriateness of climate resilience intervention(s), and to adjust as necessary to address evolving climate risks.	
5.5	Applicant has a process for monitoring and evaluation, and this is done annually.	
5.6	A grievance redress mechanism is in place to enable stakeholders to identify unanticipated adverse impacts, including a bias of investments away from high-risk locations and assets.	

Appendix 2: Guidance for completion of Adaptation and Resilience checklists

1. Identifying critical interdependencies

At a minimum, the following interdependencies should be considered:

- The effects of water use or pollution on other water users or erosion in the watershed.
- Relationships of the asset/project to nearby flood zones.
- Introduction of pests and diseases.
- Reduction in pollinating insects and birds.
- Reduction in biodiversity of High Conservation Value habitat.[96]
- Damage or reduction in value of neighbouring property due to boundary trees, other structures at risk of falling during storm events, agricultural pests, and disease.
- Fire and other practices that affect air quality.
- Market influences, such as excess supply which drives down prices.
- Appropriation of land or economic assets from nearby vulnerable groups.[97]
- Overuse of inputs.

2. Identifying potential physical climate risks

At a minimum, the following potential physical climate risks should be considered:

- Temperature; high/low temperature, change in number of hot nights, heat-spell duration, cold waves, frost.
- Water.
- Precipitation; high precipitation, intense rainfall events, waterlogging, flood, drought, freezing rain (hail, ice)
- Water stress; crop water stress (reflecting combination of temperature, precipitation, and wind), ratio of water withdrawals to availability.
- Sea-level; inundation, flooding or storm surges, salinization due to saltwater intrusion or changing water regimes.
- Glacial melting and lake outbursts; flood, body of water contained by glacier overflows or glacial melts.
- Wind; cyclones (hurricanes, tornadoes, typhoons), dust and sandstorms, blizzards, wind patterns.
- Soil; erosion (including coastal erosion), landslides, avalanches, degradation.
- Seasonality; rain onset, change in seeding date, length of growing season, change in frost-free days in season, other phenological risks specific to crop type.
- Pests and disease; new pest and disease patterns, changes in pest and disease vectors.
- Fire; increased incidence and extent of wildfires or control of agricultural fires.

[96] High Conservation Value (HCV) habitat criteria in accordance with https://www.hcvnetwork.org.

[97] According to IFC Performance Standards

- CO_2 concentrations; generally expected to create a positive effect in fertilisation, stimulating growth, and carbohydrate production, but risks changes in nutritional content and density, such as protein, sugars, and essential minerals, for example in wheat, rice, and potatoes.[98]

3. Physical climate change risks to be considered

Classification of climate-related hazards

Changes in climate patterns and in the frequency/severity of climate-related events that are:				
	Temperature-related	**Wind-related**	**Water-related**	**Solid mass- related**
CHRONIC	Changing temperature (air, fresh water, marine water)	Changing wind patterns	Changing precipitation Coastal erosion patterns and types	Coastal erosion
	Heat stress			Soil degradation
	Temperature variability		Precipitation and/or hydrological variability	Soil erosion
	Permafrost thawing			Solifluction
			Ocean acidification	
			Saline intrusion	
			Sea level rise	
			Water stress	
ACUTE	Heat wave	Cyclone, hurricane, typhoon	Drought	Avalanche
	Cold wave/frost	Storm (including blizzards, dust and sandstorms)	Heavy precipitation (rain, hail, snow/ice)	Landslide
	Wildfire			Subsidence
		Tornado	Flood (coastal, fluvial, pluvial, ground water)	
			Glacial outburst	

4 Risk assessment

Users can choose to apply climate scenarios based on representative GHG concentration pathway to ensure consideration for a worst-case scenario.

- A broad range of models can be used to generate climate scenarios.
- Time horizons for assessing climate risk in agriculture can be based on annual seasonal forecasts and every ten-year interval for the lifetime of the assets and projects. Where accurate assessments of climate variability for specific locations are not possible, worst-case scenarios can be used.
- Risks can be characterised by the associated annual probability of failure or annual costs of loss or damage.
- For assessing climate risks and vulnerabilities: the EU Regional Adaptation Support Tool (Step 2) is recommended.
- Additional guidance for risk assessment using climate scenarios: TCFD The Use of Scenario Analysis in Disclosure of Climate-Related Risks and Opportunities .

5 Measures to take to ensure 'fit for purpose'

- In addition to minimum productivity or loss, resilience also can be indicated by the variation in yield during years/seasons of climate hazards relative to the variation in yields across years/seasons with no climate hazards. This describes how closely yields under climate change hazards compare to normal variability in yields. A score of 1 or more indicates that variation in yields under the climate hazard is the same or more as the yields without climate change, in other words, good performance despite the climate hazard. A score of less than 1 indicates that productivity under the climate hazard is falling below that achieved in normal years.
- The timing of risk management may be considered. What can be done before an asset is built to reduce vulnerability? What adjustments can be made after the system is built? How can operational practices be improved to increase resilience?
- Stakeholder consultations can be used to identify different views of what constitutes significant risk of harm and unacceptable levels of harm to the system. Stakeholders should include members in the community affected.

[98] https://health2016.globalchange.gov. See also Loladze, I. (2002) Rising atmospheric CO2 and human nutrition: toward globally imbalanced plant stoichiometry? Trends in Ecology and Evolution 17: 457-461; Müller, C., Elliott, J., and Levermann, A. (2014) Fertilizing hidden hunger. Nature Climate Change 4: 540-541, Myers, S.S., Zanobetti, A., Kloog, I. et.al. (2014). Increasing CO2 threatens human nutrition. Nature 510: 139-142

Examples of resilience practices in agriculture are provided below for information only. The measures selected for the farm holding and associated assets in question must be selected to be appropriate for the identified risks for that holding in its specific context.

- Improved or more stable productivity (economic buffering of climate impacts): increasing yields or yield stability, or reducing costs to produce net gains in product or revenue; diversified production; enhancing savings and value of assets; increasing efficiency of water, energy, fertiliser, and other inputs; improving product storage capacities; using the agronomic practice best suited to changing climatic conditions; reducing the percentage of area planted to vulnerable crops; increasing the percentage of production under controlled environment agriculture.
- Adapted stock: using species and breeds adapted to changes in CO_2 and climate, e.g., temperature, water regimes, extreme events, or seasonality.
- Ecological buffering of climate impacts: water or microclimate management, e.g., irrigation, water storage, increased soil water holding capacity, agroforestry to buffer extreme temperatures or enhanced soil organic carbon; ecological diversification, including shifting land use from monoculture to polyculture or other diversified production; riparian buffer strips; soil and water conservation; mangrove management; habitat restoration.
- Risk management: hard assets (weather stations, satellites, computing, and communication infrastructure) used for climate information services and early warning systems; crop insurance; monitoring and evaluation of farm performance; identification and management of risks beyond design standards (e.g., of levees/embankments, or other physical infrastructure); emergency preparedness, and other services that help avoid or compensate for climate risk at the farm level.
- Physical relocation of vulnerable assets or activities: avoided use of locations vulnerable to climate risks such as flooding, salinisation, or heat stress.

6 Identifying do no harm aspects

At a minimum, the following should be considered in terms of the production unit/ intervention/ enabling measure's potential to 'do harm' to the system it operates within:

- The effects of water use or pollution on other water users or erosion in the watershed.
- Increased risk of flooding.
- Introduction of pests and diseases.
- Reduction in pollinating insects and birds.
- Reduction in biodiversity or High Conservation Value habitat.[99]
- Damage or reduction in value of neighbouring property due to boundary trees, other structures at risk of falling during storm events, agricultural pests, and disease.
- Fire and other practices that affect air quality.
- Market influences, such as flooding a market with a commodity and driving down prices. Appropriation of land or economic assets from nearby vulnerable groups.
- Overuse of inputs.
- Decline in the productivity of an asset.
- Decline in conditions below an applicable policy standard.
- No use of chemicals listed in the Stockholm Convention, or 1a or 1b in the WHO classification of pesticides by hazard, [100,101] or not in compliance with the Rotterdam Convention.

[99] High Conservation Value (HCV) habitat criteria in accordance with https://www.hcvguidelines.org/. [37] According to IFC Performance Standards

[100] http://www.pops.int/

[101] https://www.who.int/ipcs/publications/pesticides_hazard/en/ [40] http://www.pic.int/

Appendix 3. Additional information on biodiversity safeguard

TNFD and SBTN partnered to provide Guidance for corporates on science-based targets for nature (2023). This guidance provides an overview of relevant science-based targets for nature (SBTN) guidance to set science-based targets for nature. It includes an overview of SBTN's methods and 5-step approach to setting science-based targets for nature, and insight into how SBTN and TNFD guidance fit together in practice. The relevance of this to the Crop and Livestock Criteria is to help potential applicants to track their progress over time and provide evidence to support progress over the period of certification.[102]

IFC Performance Standard 6 – Biodiversity Conservation and Sustainable Management of Living Natural Resources (2012), provides detailed definitions of key issues related to effective biodiversity management and the associated clear steps that should be considered and followed to avoid significant harm to biodiversity and where appropriate deliver biodiversity net gain. Consequently, it makes IFC PS6 provides an effective and practical resource for potential crop and livestock issuers to utilise to identify key conservation and biodiversity management strategies that would be a credible sources of evidence to reference in fulfilling the biodiversity safeguards core requirements.

UNEP Land Use Finance Impact Hub (2023) provides six examples of KPIs related to biodiversity that could be considered as a key performance indicator included for investors to track progress over time against biodiversity impacts.[103] The Criteria would promote this resource as an tool to can guide applicants on potential KPIs that could be used to monitor and track progress on the state of biodiversity linked to crop and livestock production, and count towards evidence of meeting the biodiversity safeguard.

GLOBALG.A.P certifications are also an indication of commitment towards responsible production practices that consider biodiversity related issues. Specifically, GLOBALG.A.P. offers core solutions that provide internationally recognised standards for primary production and the supply chain and Integrated Farm Assurance for different agricultural products. These standards usually result in a certificate that is widely recognised in global markets and frequently requested by buyers as a trading requirement. These standards can be flexibly combined with add-ons to target specific topics in more detail. Of particular relevance is the add-on of BioDiversity that specifies a set of science-based requirements which help producers demonstrate their on-farm biodiversity management practices and retailers to identify suppliers that fulfil their corporate social responsibility pledges. Designed to be paired with Integrated Farm Assurance (IFA) for fruit and vegetables, the audit covers aspects such as soil management, land restoration measures, and integrated pest management. The add-on monitors, enhances, and protects key on-farm biodiversity aspects, raising awareness and providing guidance on the development of a comprehensive biodiversity action plan.[104] Use of IFA and BioDiversity add-ons it can send a clear signal of compliance with the biodiversity safeguard.

[102] TNFD and SBTN, (2023), Guidance for corporates on science-based targets for nature – TNFD

[103] UNEP (2023) KPI List - Land Use Impact Hub

[104] GLOBALG.A.P, (2023), BioDiversity (globalgap.org)

Appendix 4. Additional guidance for meeting the social safeguard from existing standards and regulations

1. *Accountability Framework Initiative (2023)*

The Accountability Framework Initiative (AFi) provides detailed guidance on key issues related to consideration of social issues, on which it includes detailed operational guidance on aspects of social issues:

- Operational Guidance: Workers Rights (2021) - guidance on ensuring respect for workers' rights within company operations and supply chains, expanding on the workers' rights provisions, including summaries, best practices, and links to support.
- Operational Guidance: Free Prior and Informed Consent (2020) - guidance outlining company best practice in securing the free, prior, and informed consent (FPIC) of indigenous peoples and local communities in operations and supply chains.
- Operational Guidance: Monitoring and Verification (2020) - guidance on monitoring and independent verification of commitments to no-deforestation, no-conversion and human rights, following recognised norms and good practice. Focused on performance at the supply base level.
- Operational Guidance: Remediation and Access to Remedy (2020) - Guidance on how companies can ensure proper access to remedy and remediation of human rights harms in their supply chains and operations, including the use of grievance mechanisms.

2. *AFi and TNFD (2023)*

AFi´s core principles are also included in TNFD Agrifood draft sector guidance (2023). Table 20 below details potential response options on social aspects in agriculture production units:

Table 20. Example of common risks to social aspects and potential response options (Source: Climate Bonds own elaboration based on TNFD analysis, 2023)

Risk to social aspects	Response option (as in TNFD, 2023)
Human rights and engagement with indigenous peoples, local communities and affected stakeholders	• Commit to providing support to smallholder producers to help them enter responsible supply chains and improve their yields and production practices.[105] • Commit to testing for free, prior, and informed consent (FPIC) of potentially affected indigenous peoples and local communities before acquiring new interests in land or resources and before new developments or expansions.[106] • Commit to respecting and refraining from land acquisition or development until existing conflicts linked to customary rights to land, resources and territory have been resolved.[107] • Commit to a zero-tolerance approach to violence and threats against forest, land, and human rights defenders.[108]

Therefore, utilisation of the AFi's operational guidance and commitment to their core principles would provide sufficient evidence to meet the social safeguard.

[105] AfI Guidance, Smallholders in Sustainable Supply Chains, Principle 3.1

[106] Accountability Framework Initiative, Core Principles, Core Principle 2.2.3., p 7

[107] Accountability Framework Initiative, Core Principles, Core Principle 7.1, p 18

[108] Accountability Framework Initiative, Core Principles, Core Principle 2.1.7, p 7

3. *UN Guiding Principles and OECD Guidelines for Multinational Enterprises*[109]

There are numerous different guidelines with respect to human rights. However, two have a direct effect on companies and investors: The United Nations Guiding Principles on Business and Human Rights (UNGPs) and The OECD Guidelines for Multinational Enterprises (MNEs), which are summarised below to provide an overview of each of the components and their individual focus of each.

United Nations Guiding Principles on Business and Human Rights

The UNGPs are a set of guidelines implementing the United Nations' 'Protect, Respect and Remedy' framework for the responsibilities of transnational corporations and other business enterprises regarding human rights.[110] Developed by the Special Representative of the Secretary-General (SRSG), John Ruggie, these guiding principles provided the first global standard for preventing and addressing the risk of adverse impacts on human rights linked to business activity. They also continue to provide the internationally accepted framework for enhancing standards and practice regarding business and human rights. The UNGPs encompass three pillars outlining how states and businesses should implement the framework:

1. The state duty to protect human rights.

2. The corporate responsibility to respect human rights.

3. Access to remedy for victims of business-related abuses.

OECD Guidelines for Multinational Enterprises

The OECD Guidelines for MNEs are a comprehensive set of government-backed recommendations on responsible business conduct. The governments adhering to the Guidelines aim to encourage and maximise the positive impact MNEs can make to sustainable development and enduring social progress. The Guidelines are important recommendations addressed by governments to multinational enterprises operating in or from adhering countries. They provide voluntary principles and standards for responsible business conduct in such areas as:

1. employment and industrial relations;
2. human rights;
3. environment;
4. information disclosure;
5. combating bribery;
6. consumer interests;
7. science and technology;
8. competition; and
9. taxation.

It is important to note that these guidelines do not focus on the impact social factors can have on investments (financial materiality) but rather on the responsibility investors have for the adverse impacts their investments/companies can cause to society. Today, many investors are convinced that they should take ESG factors into account, but these guidelines require governments and investors to adopt a so-called double (or dual) materiality approach which takes the (positive and negative) 'social return on investments' into account The OECD guidelines and UNGPs are further backed by the European Union (EU) corporate social responsibility (CSR) strategy, its regulation on sustainability-related disclosures in the financial services sector, and its taxonomy for minimum social safeguards for sustainable activities.

[109] OECD Guidelines for multinational enterprises - OECD

[110] Business & Human Rights Resource Centre. (2019). UN Guiding Principles. www.business-humanrights.org/en/un-guiding-principles

4. *UK Modern Slavery Act (2015)*

The Modern Slavery Act (2015) from the United Kingdom in Part 6, requires both medium- and large-sized companies to provide a slavery and human trafficking statement each year, which sets out the steps taken to ensure modern slavery is not taking place in their business or supply chains.[111,112]

Many of these statements provide not only general information but also specific numerical data, such as the number of audits initiated for suppliers at high risk or the number of suppliers that have established corrective action plans, which can help investors assess materiality.

5. *GLOBALG.A.P (2023)*[113]

GLOBALG.A.P certifications are also an indication of commitment towards responsible production practices that consider social aspects. In particular, the GLOBALG.A.P. Risk Assessment on Social Practice (GRASP) is an add-on to Integrated Farm Assurance (IFA) for the evaluation of workers' well-being at farm level. Building on the IFA principles and criteria (P&Cs) related to workers' health and safety, and covering topics such as labour and human rights, representation of workers, and the protection of children and young workers, GRASP is a simple but robust evaluation checklist that producers can use to assess, improve, and demonstrate their responsible social practices.[114]

[111] It should be noted and emphasised the inclusion of this Modern Slavery Act from the United Kingdom is not an expectation that all aspects of the Act would be applied and fulfilled in different geographies. Rather, it is included as an example of compliance with leading international regulatory expectations on the topic of human trafficking and modern slavery compliance.

[112] HM Government, (2015), Modern Slavery Act 2015 (legislation.gov.uk)

[113] GLOBALG.A.P., (2023), GLOBALG.A.P. | Smart farm assurance solutions (globalgap.org)

[114] GLOBALG.A.P., (2023), GLOBALG.A.P. Risk Assessment on Social Practice (globalgap.org)

Appendix 5: TWG and IWG members

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Participation in IWG meetings does not necessarily reflect endorsement of the Criteria and serves to provide critical feedback on the usability-focused consultation process.

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