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Agri-food Transition Principles

Discussion Paper

(summary version available at [this link](#))

Prepared by the Climate Bonds Agri-Food Standards Team

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Key Messages

1. The diversity, fragmentation and context specificity of agri-food systems all create challenges for defining a transition to net zero that encompasses climate, biodiversity, adaptation, resilience and social justice.
2. Agri-food supply chains are complicated, geographically diffuse and often opaque; responsible sourcing can be a challenge and expensive to monitor.
3. The wider Agriculture, Forestry and Land Use (AFOLU) sector is required to reach net zero before 2050 and play an important long term role in balancing global emissions; there are a range of decarbonisation measures available to the sector, and these need to be incorporated into transition plans.
4. Technological tools are emerging that have the potential to greatly reduce GHG emissions and support sustainable practices, as well as attracting investment; they range from controlled production environments, anaerobic digestion, precision farming and cold chain technologies through to alternative proteins and feed additives.
5. Agri-food transition needs funding; several frameworks exist to guide this transition finance and they demonstrate the need for innovation, as well as avoiding deforestation and conversion of natural habitats, transition must enhance biodiversity and ecosystems, conserve water, reduce food loss and waste and ensure a just transition.
6. Transition finance instruments have been issued for agri-food investments, including Sustainability-Linked Bonds (SLBs) and Use of Proceeds Bonds (UoP), but their climate credentials appear unreliable; gaps are observed between pledges and actual actions and scope 3 emissions coverage is lacking.
7. Transition finance for agri-food is in urgent need of a robust framework to align with 1.5°C climate targets, as well as the other sectoral sustainability objectives to provide market confidence as well as provide issuers with guidance as to what “good” looks like.
8. Climate Bonds’ transition framework is built on robust and ambitious Principles, including 1.5-degree alignment, science-based targets, excluding offsets but including scope 3 emissions, based on technological viability and pursuing actions rather than making pledges.
9. Additional Hallmarks for transition have been established to provide guidance for entities to develop robust transition plans that are both acted on and reported on.
10. This paper uses the Climate Bonds Principles and Hallmarks to create a framework for transition in the agri-food system and address some of the challenges identified, including land use change, biodiversity, water use and quality, food loss and waste, circularity and just transition
11. Further work is under way to develop a robust and comprehensive agrifood transition framework; this will help to shape a dedicated assessment tool for agri-business transition plans and criteria to assess procurement strategies; additionally, four sets of criteria will be developed, focusing on key areas for agri-food transition finance.

1. Introduction

Within the context of its Transition Programme, Climate Bonds Initiative (Climate Bonds) aims to build consensus with key stakeholders on 1.5°C and climate resilient, agri-food transition pathways (and associated standards) that are rooted in science and consistent with other food system transition outcomes. This includes the development of investment guidance for sub sectors to mobilise capital markets to invest in credible transition activities.

As part of the work, this paper provides a critical appraisal of existing agri-food transition finance tools, and introduces the sector neutral *Credible Transition Principles*,¹ (2020), and *Hallmarks for Transforming Companies* (2022) developed by Climate Bonds.² We interpret the Principles and Hallmarks from an agri-food perspective, providing real world examples of their application and, finally, we examine existing frameworks and pathways for agri-food transition, to explore how they address decarbonisation and other food system goals. This prepares for the development of a reliable agri-food transition framework for investors and issuers.

The paper aims to facilitate engagement of thought leaders, promote the principles across the agri-food investment community and build consensus on the levels of ambition needed in agri-food transition.

2. Background

Agri-food systems are responsible for 31% of global anthropogenic greenhouse gas (GHG) emissions,³ drive nearly 90% of global **deforestation** annually;⁴ and degrade other important natural habitats such as peatlands and permanent grassland. Additionally, agriculture uses on average 70% of **freshwater** withdrawals, creating enormous challenges in water-scarce countries;⁵ whilst water pollution from agriculture has important impacts on human health and natural ecosystems.⁶ Regarding **biodiversity**, agriculture has led to steep declines in populations and ranges across all species groups⁷ caused by expansion of human colonisation and related soil, water and air pollution, which combine to reduce habitats and degrade ecosystems.⁸ In addition only 55% of the world's agricultural production (calories) go towards feeding people directly; the rest are fed to livestock (36%) or turned into biofuels and industrial products (9%).⁹ Of the food produced, as much as 31% is **lost or wasted** along the supply chain: around 14% is lost from production before reaching the retail level¹⁰ and a further 17% wasted in households, catering and retail.¹¹ It is within this context that the demand for food is projected to double from 2020 to 2050, putting further pressure on use of land and natural resources and so, innovative and sustainable solutions are in demand across agri-food systems.^{12, 13}

At the same time, agri-food is highly vulnerable to climate change, production depends on predictable temperatures, rainfall and stable storage conditions. As such, the sector must be at the forefront of a resilient transition to net zero that both decarbonises the sector but also increases resilience to climate shocks, protects biodiversity and ensures food security. In addition, global climate change scenarios that plot decarbonisation paths have made it clear that the wider AFOLU sector is required to reach net zero before 2050 to balance GHG emissions through carbon removal (sequestration).¹⁴

However, the diversity, fragmentation and context specificity of agri-food systems all create challenges for defining this transition to net zero. Agri-food supply chains are complicated and geographically diffuse meaning transparency and responsible sourcing can be a challenge to establish, and expensive to monitor. To support action, a range of science-based pathways to net zero are being developed for the sector, these need to be incorporated into the transition plans being developed by companies to deliver on their net zero commitments.

The European Investment Bank (EIB) argues that research and development (R&D) investment is the top priority for sustainable agri-food growth.¹⁵ Innovation examples include development of digital technologies including precision farming, sustainable packaging, low carbon logistical options through the supply chain and blockchain-based food tracing.¹⁶ This will require positive action and will not happen naturally if left to current market forces due to the difficulty in financing innovation and the fact that agri-food businesses are interdependent and generally compete

more on price than on quality, innovation or environmental impact. Price competition, in combination with low margins and long payback periods, limits the appetite and possibilities for innovation and risk-taking, which reduces the financing of agri-food modernisation.¹⁷

Actions need to address the environmental impact of global agri-food systems if we are to limit the temperature increase to 1.5°C above pre-industrial levels, as set out in the 2015 Paris Climate Agreement. These actions require increased financing from multiple actors to help enable transition, alongside regulatory and policy support. There is a need to shift from the current, business-as-usual agri-food system, to one that significantly reduces its environmental footprint, respecting the Paris Agreement and international commitments on deforestation and biodiversity.

Despite the positive momentum, the sector remains heavily underfunded relative to other climate-focused sectors.¹⁸ Capital is flowing into food and agriculture sustainability transition, but not at the scale necessary to meet both the challenges and opportunities facing the sector.¹⁹ The need for investment will only continue to grow over time, as food system sustainability issues achieve greater recognition. According to Net Zero Financing Roadmaps, **investment of at least USD150bn per year is needed across agriculture, food and land use over coming decades.**²⁰

3. Review of existing agri-food transition bond finance

A variety of financial instruments are employed to support agri-food investments, including debt, equity and grants. As our mission is focused on capital market flows and debt this paper will focus on two types of debt instruments emerging for transition finance; transition Use of Proceeds and Sustainability Linked Bonds.

The bond market is a key focus of debt issuance in agri-food; large-scale investments have been mobilised, typically over USD100m and issued over long periods, usually 5-10 years.²¹ For non-financial corporate issuers, including supply chain operators and retailers, bond financing could help support the formation of stable transition strategies to improve sustainability.²² For investors, financing labelled agri-food bonds signals a commitment to sustainable transition, diversifies portfolios and offers fixed returns, avoiding traditional equity volatility.²³

A small but growing number of bond issuers across all sectors of the economy have used the term 'transition', or labels like 'climate action bonds' or 'sustainable transition bonds', to describe issuance in hard to abate sectors that don't reach the ambition level of "green" bonds. In the absence of a market-adopted standard for transition bonds, some of these proposals and transactions have raised concerns about inconsistencies across labels and the potential for 'greenwashing'. This has led to calls for a common framework and robust methodologies to provide clarity on the green benefits of transition-related bonds and corporate strategies.²⁴

It has also led to hesitancy towards engaging in transition finance, due to concerns over credibility. Transition finance instruments are often considered inferior to other more established products, like green bonds. Consequently, investors are seeking reassurance that transition activities, such as technological innovations that decarbonise supply chains, are credible, follow rigorous standards and are not examples of 'greenwashing'.

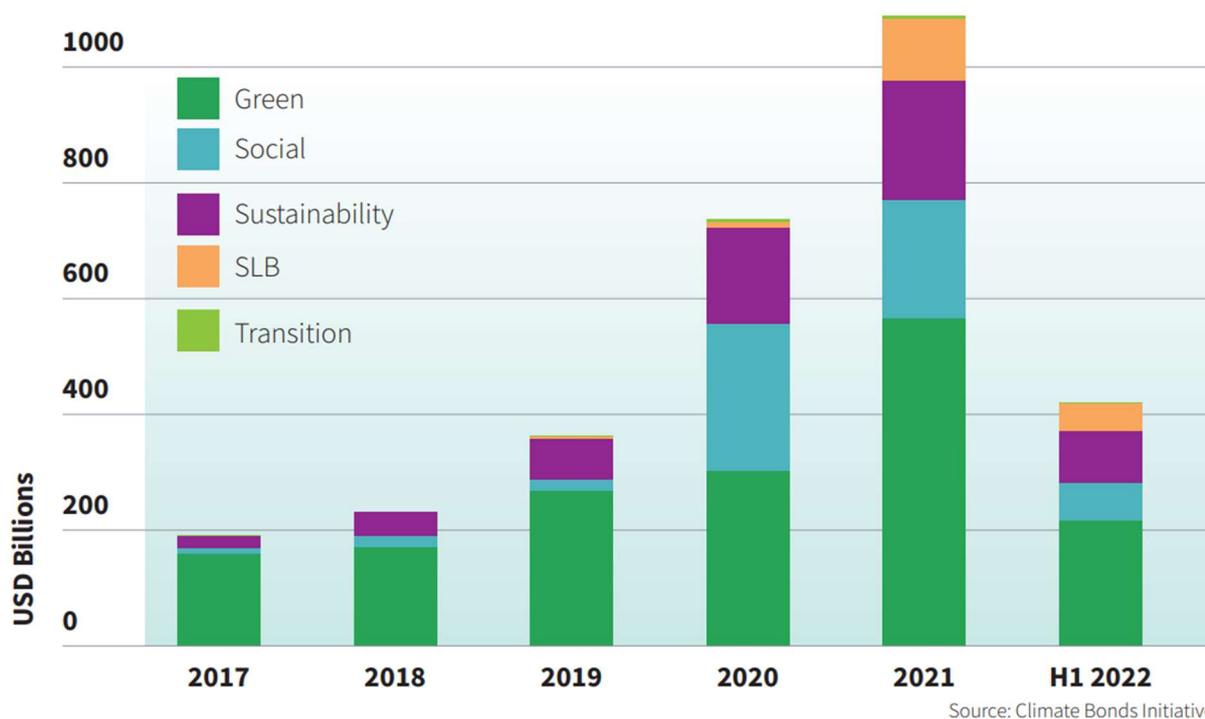
3.1 Sustainability-linked bonds and use of proceeds bonds

SLBs are general purpose finance, characterised as forward-looking, performance-based bond instruments, for which the issuer is committing to future improvements in sustainability outcomes within a predefined timeline.²⁵

UoP bonds are characterised as investments in specific assets and projects and they may or may not be accompanied by information on aligned corporate strategies: This instrument encompasses green, social, sustainability and transition labelled bonds.

Despite the aforementioned hesitancy over credibility, there has been a rapid growth in sustainable debt finance since 2017, with only a slight slowdown in the first half of 2022, as indicated in Figure 1, below.

Figure 1: Growth in sustainable finance instruments 2017-2022 first half (Source: Climate Bonds, 2022)²⁶



Transition finance guidance is also emerging. The International Capital Markets Association (ICMA) transition finance handbook and SLB principles are the most widely used in the market at present. These provide high level general principles for finance instruments and offer illustrative key performance indicators (KPIs) that measure what will be tackled.²⁷ However, clear, sector-specific pathways and ambitious performance targets (PTs), which set the goals for improvement, are beyond the scope of these principles. To date, the market has seen issuances of varying quality and fairly low ambition levels, rarely linked to independent science-based sector decarbonisation pathways that are aligned with a 1.5-degree trajectory.

Illustrative Example

An agri-food processing firm defines a decarbonisation trajectory for its facilities through to 2050, and uses this to formulate a set of emission reduction performance targets for scope 1 and 2 emissions to issue an SLB.

Analysis:

Concerns relate to the relevance, reliability and ambition of the self-defined transition or decarbonisation pathway. Unless this is independently created based on global carbon budgets and tailored to the sector the reductions are difficult to benchmark against peers or to understand in the context of national or global commitments to keeping within 1.5 degrees of warming. As up to 90% of emissions can fall within upstream and downstream scope 3, solely addressing scope 1 and 2 emissions within its SLB performance targets may represent a significant omission and fail to demonstrate meaningful change.

There is concern that such issuances have represented ‘business-as-usual’ by another name. So, while the market has seen impressive growth, rigorous evaluation of bond impact has been difficult. To date, there is limited evidence that

agri-food sector SLBs or UoPs have demonstrated the full decarbonisation potential of these transition finance instruments.

Climate Bonds own market data provides a breakdown of selected SLB issuances, which have been identified in agri-food up to August 2022. It shows that many agri-food bond issuances have been SLBs with a performance linkage in their design and they have been issued by non-financial corporates. These represent some of the largest multinational agribusinesses and wholesalers currently operating in the market, including JBS, Tesco, Marfrig, General Mills and Woolworths. The geographical scope of SLBs and UoP is wide, but there are key gaps: no issuances have been recorded in **India** or **Ukraine**, leading players in agri-food. Potentially, they represent major markets for these bonds, if they are to be used as tools to support large scale decarbonisation.

Climate Bonds have analysed these labelled transition agri-food bond issuances to determine the main current characteristics. ICMA SLB Principles and/or SBTi frameworks were the most commonly used external principles, and verification of the sustainability claims for these bonds were provided by Second Partner Opinion providers (SPOs) such as Vigeo Eiris, Sustainalytics, ISS ESG and the Governance Group.

Typically, the performance targets (PTs) used in agri-food finance are linked to GHG emissions reduction commitments and UN Sustainable Development Goals (SDGs). In the bonds analysed, most issuers set PTs only for scope 1 and 2 emission reductions; with only two companies explicitly setting scope 3 emissions PTs (see Section 4 on Climate Bonds requirements). The failure to incorporate scope 3 emissions and associated reduction targets means that **companies are failing to account for the full climate impact of their activities along the value chain in their performance targets.**

Agri-food has long, complex supply chains and so GHG emissions of many firms are spread upstream and downstream (scope 3). For companies like Tesco, this element accounts for up to 90% of their total emissions; it's 96% for General Mills and 98.9% for DLG Group.²⁸ Therefore, to count only scopes 1 and 2 emissions fundamentally undermines the notion that an agri-food company is reducing its 'total' emissions as, in many cases, this would fail to include the vast majority of emissions.

Overall, the climate credentials of many transition finance issuances in the agri-food sector to date appear unambitious and are not yet aligning consistently with science based pathways to net zero. Therefore, a robust framework is needed to support the sector's alignment with 1.5°C climate targets and agri-food goals to generate market confidence, as well as providing issuers with guidance as to what 'good' looks like.

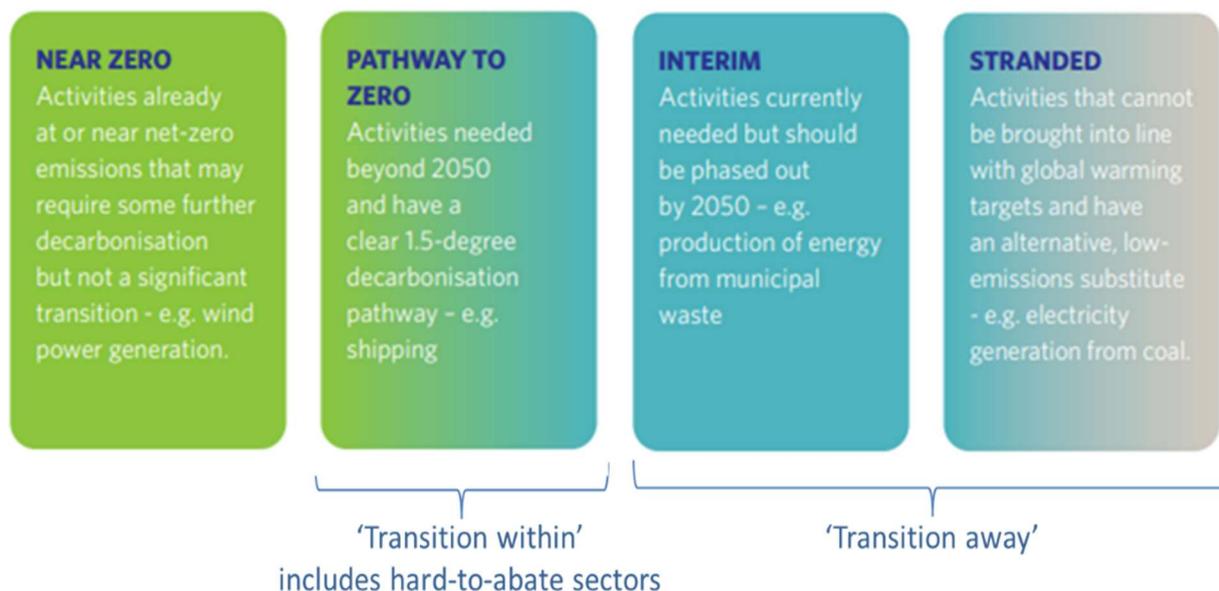
4. Transition principles and hallmarks for transforming companies

'Good' transition finance must be credible. To help define this, Climate Bonds has established a set of five **Transition Principles**²⁹. They require science-based, 1.5-degree aligned targets, exclude offsets but include scope 3 emissions, are based on technological viability and depend on action rather than pledges. These are discussed further below.

To support the implementation of the principles, Climate Bonds sets out four **transition categories** for economic activities, each one reflecting the potential for alignment with a net zero economy: near zero, pathway to net zero, interim and stranded. This facilitates an **inclusive** approach, whereby transition finance can be tailored to suit nuanced objectives. See Figure 3, below, for further explanation. Agri-food examples are shown in Annex 1.

The categorisation is based on: (1) the length of time a product or service delivered by the activity is needed, this depends on the availability of low-carbon substitutes, and (2) the possibility of decarbonising the activity, so that it aligns with the Paris Agreement.

Figure 2: Transition categories for economic activities

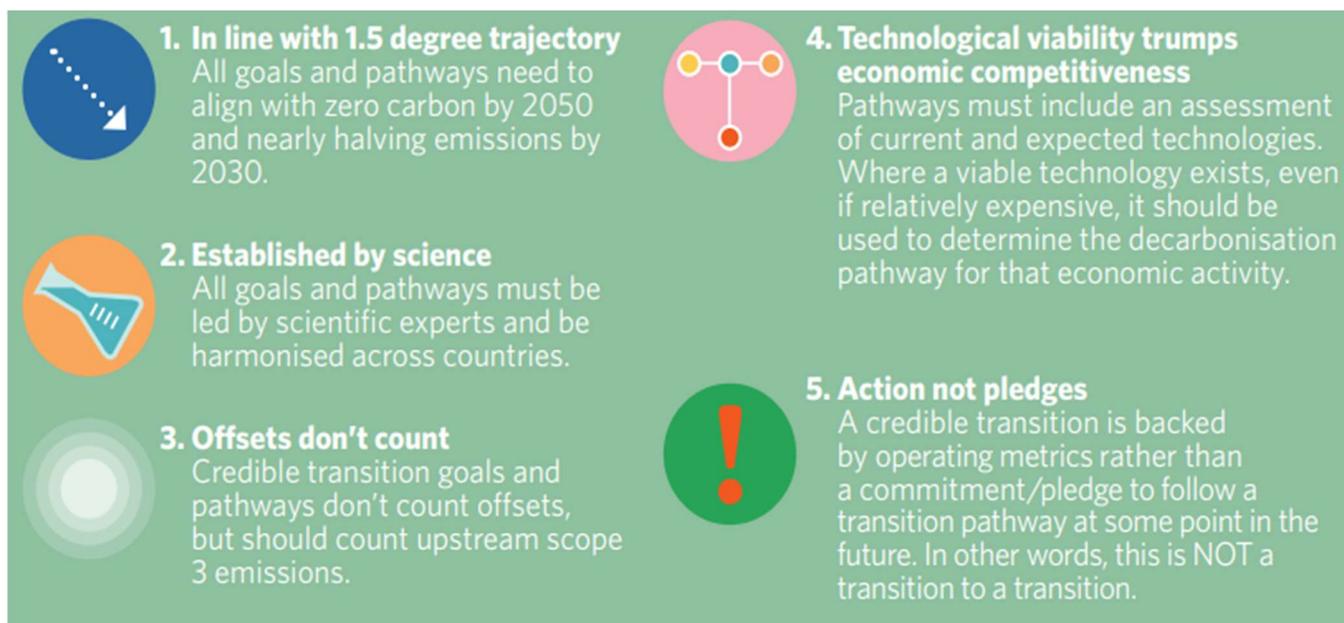


Source: 'Financing Credible Transitions' Climate Bonds Initiative in partnership with Credit Suisse, September 2020

Promoting credible transition finance

To support ambitious transition, in 2020 Climate Bonds established a set of five **Transition Principles** for economic activities, set out in Figure 3, below. Importantly, **any entity, activity or project** meeting these principles is considered to be substantially contributing to the attainment of the Paris Agreement goals and should therefore be eligible for capital investment that has a climate or environmental mandate. Whilst the Principles were initially designed to address GHG emissions reductions, they can also be adapted to other agri-food system goals.

Figure 3: CBI's Five Credible Transition Principles



Establishing a framework for credible transition by companies.

Taking this a step further, Climate Bonds has developed a framework dedicated to **transition at the entity level**, which offers a more detailed examination of a company's climate-related ambitions and actions. It is aimed to support

companies to develop **transition plans** that can deliver rapid change and align with the global goal to nearly halve emissions by 2030 and reach net zero by 2050, in line with the Paris Agreement. It is referred to as the Hallmarks for credible transition (Figure 4).³⁰

The five Hallmarks enable an encompassing view of a company’s transition plan, taking into consideration:

- a) the level of ambition of the targets set (Hallmark 1 - which itself encompasses the 5 Transition Principles).
- b) the willingness and ability to deliver on those targets (Hallmarks 2-4) and
- c) general reporting robustness and transparency, which is important for the market (Hallmark 5).

The Hallmarks focus on the essentials needed to demonstrate a credible transition, rather than covering all aspects of related components. This is to address concerns from issuers and investors over the burden of information and reporting requirements, while maintaining robustness and credibility. It complements existing ESG frameworks and methodologies, but also goes beyond them. It emphasises key governance elements that are important indicators of a company’s willingness and ability to deliver on its decarbonisation targets, but also adds the granularity needed to ensure those targets are ambitious and in line with agreed climate goals.

Figure 4: The Hallmarks of a credibly transitioning company



Certifying different performance levels

Within the transition, companies will perform at different levels, according to the sector, local context, degree of commitment and technology available. Climate Bonds is inclusive and supports the whole of economy transition within the new system of certification for non-financial corporates and SLBs (the Standard & Certification Scheme version 4.0) available [here](#). It provides guidance to issuers and assurance to investors around the credibility of transition related financial instruments, both SLBs and UoPs, through setting the requirements of a credible transition plan.

The Hallmarks are the foundation of this certification standard, but the standard goes further to provide the additional level of detail and granularity required for a robust, transparent and coherent assurance scheme. This is to give clear guidance to issuers, investors and verifiers alike, and ensure consistent assessment and evaluation across all certified entities and instruments.

Through certification, Climate Bonds aims to recognise all entities already compatible with a net zero economy, aligned with 1.5 degree warming limits, or those making a rapid and ambitious transition towards it, whatever their starting

point. The scheme suggests two different ‘tiers’ of performance. Specifically, certification is available to Assessed Entities where at least 90% of their revenue or emissions is from activities whose performance either has:

1. Performance targets (PTs) aligned with the relevant entity-level sector-specific criteria of the Climate Bonds Standard at the time of certification and over the short-, medium- and long term, and the Transition Plan is deemed to be credible evidence that those future PTs will be met.
2. PTs of the assessed entity currently not aligned with the sector-specific criteria of the Climate Bonds Standard at the time of certification, but are expected to align by 2030, and the Transition Plan is deemed to be credible evidence that these PTs for the short-, medium- and long term will be met.

4.1 Transition Principles from an agri-food perspective

Principle 1	In line with 1.5-degree trajectory
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	All goals and pathways need to align with zero carbon by 2050 and nearly halving emissions by 2030.
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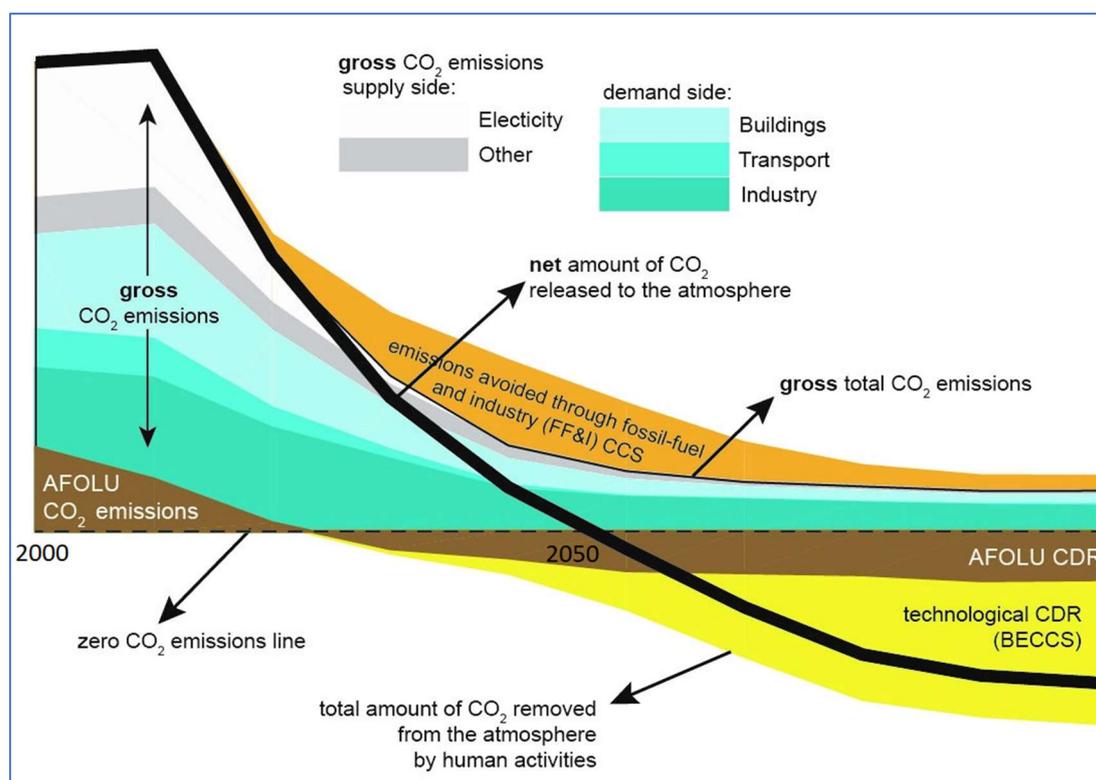
The Paris Agreement aims to keep global warming below 2 degrees and ideally 1.5 degrees, equating to global net zero emissions collectively by 2050 and halving emissions by 2030. This is a challenging goal requiring all sectors to maximise both emissions reduction and carbon sequestration as early as possible and continuously improve over time, in line with their sector-based pathways.

As a predominantly land-based sector, agri-food is inextricably interconnected with wider land use (encompassed by AFOLU). Land use change, in the form of deforestation and removal of non-forest natural habitats to create farmland, has been a major contributor to GHG emissions in recent decades, alongside livestock and crop production. In the near term, pathways that include concerted mitigation efforts to avoid deforestation, conserve and restore land carbon stocks and protect natural ecosystems, **can contribute to net-zero emissions being reached well ahead of 2050 in the AFOLU sector** (see Figure 5). Moreover, reforestation, afforestation and other land-based sequestration activities, such as habitat restoration, improved soil management and other decarbonisation measures discussed below, can all serve to create a substantial negative emissions balance for AFOLU well before 2050, helping to reduce global emissions to net zero. Beyond 2050, AFOLU sequestration will play a vital role in maintaining global net zero.

AFOLU is subject to a variety of competing needs, including food and nutrition security, bioenergy, habitation, carbon sequestration, biodiversity and a range of other ecosystem services, change will be driven by respective demand changes, as well as technological advances and policy changes. As we move closer to 2050, transition pathways point towards an increase in forested land and a reduction in pasture and cropland, enabled by increased crop yields and improved efficiency of livestock production and shifts in consumption patterns. A key area of contention relates to land use for bioenergy, especially considering the current energy crisis.

Reaching net zero will require efforts to reduce the full range of GHG emissions through better management of production, including reducing methane and nitrous oxide emissions from rice paddies, manure, livestock feed and fertiliser use, whilst reducing food losses and improving energy use efficiency during food processing. On the demand side, the transition requires dietary to shift to healthier, more sustainable diets, including reduced consumption of animal products in the Global North and measures to avoid food waste, embracing the circular economy.

Figure 5: Break down of global anthropogenic CO₂ emissions until 2100 (IPCC, 2019)



Adaptation measures will be vital to ensure adequate nutrition considering the vulnerability of agricultural production to climate change, especially in the Tropics. Moreover, the increased frequency of extreme climatic events can significantly impede the efforts to reaching net zero and disrupt supply chains. Some options provide dual benefits, for both adaptation and mitigation, including techniques commonly associated with sustainable agriculture, mixed crop-livestock systems and agroforestry as well as more technological solutions such as biotechnology and agrometeorological services. The feasibility of these alternatives varies between geographies and markets.

Compared to other sectors, AFOLU faces particular challenges for defining common transition pathways due to the **highly fragmented nature of the sector and the high degree of context specificity** faced across climate zones, habitats, soil types, cultures and production systems.

To respect net-zero commitments, agri-food entities will be required to pursue transition plans, production methods and procurement strategies that incorporate, promote or adapt to the aforementioned pathways, as relevant to their particular activities. Importantly, as well as addressing 1.5-degree climate transition, these actions will need **to account for biodiversity, water use and quality, food loss and waste, circularity and just transition**. In view of the competing needs mentioned above this will also help to address the wide range of applicable UN SDGs.

Section 5 outlines sectoral pathways, transition standards and definitions developed by a range of organisations for companies to utilise. The objectives and target audience of each organisation varies, which means a '1.5-degree trajectory' or the definition of 'pathway' may also vary. It might be the explicit focus (in terms of an emissions pathway in line with carbon budgets), or it could be addressed through less tangible means such as zero deforestation.

In order to define credible transition-, short-, medium- and long-term targets are required to track progress. A 2050 net zero target with no intermediate targets is insufficient for transition. For GHG targets, all material emissions scopes should be considered, and targets set based on independent sector-based pathways such as the recent SBTi FLAG sector guidance.³¹ Importantly, transition pathways should not be based on offsets, instead focusing on decarbonising activities to the fullest extent possible (discussed further in principle 3).

Agri-food systems comprise a wide variety of companies engaging in one or a range of activities along the value chain, from production to handling and storage, processing and packaging, distribution and retail, consumption, recovery

and re-use.³² Therefore, Paris-aligned transition pathways for each of these different value chain activities may vary and activities cannot be assumed to be “pathway to zero”, some may be stranded.

Crop production, for example, can be considered a ‘**pathway to zero**’ activity, in view of available decarbonisation measures such as the adoption of regenerative farming practices, agroforestry, precision farming technology and the restoration of degraded land to reverse land use change.

Intensive **animal production in its current production and consumption practices** may be an example of ‘**interim**’ activity, **phased out after 2050 due to its** very high GHG-intensity relative to other food groups. While there is continuous innovation to decarbonise production, limited pathways exist to 1.5-degree alignment, compared to moving to less GHG-intensive substitutes. It should be noted, however, that there are trade-offs beyond just GHG emissions, as some foods can see large volumes of water usage or require vast tracts of agriculture land to be cultivated. The challenges of decarbonising animal production have significant ramifications downstream, through the value chain, as processors and retailers grapple with the task of reducing their scope 3 supplier footprint (see Principle 3). Meanwhile, it should be noted that animal production can be critical to livelihoods of groups such as pastoralists and so a nuanced approach is required across regions.

There is potential for animal production to move towards a ‘**pathway to zero**’ as part of a mixed farming system, in combination with cropping and silvopasture, in view of the circular synergies than can be achieved within the system.

For **handling, storage, processing and distribution** activities, positive steps can be taken to improve energy use efficiency through the value chain, in refrigeration, heating and cooling processes, and low-carbon freight and shipping transportation options which, at present, have a clearer ‘**pathway to net-zero**’ by 2050, subject to the screening indicators identified by Climate Bonds. Examples are outlined in Annex I.

If these activities are pursued effectively, in combination, they have the potential to create a large negative emissions balance for AFOLU well before 2050, helping to reduce global emissions to net zero.

Principle 2

Established by Science

All goals and pathways must be based on science to remain within global carbon budgets.

This principle enables pathways and activities to remain within the scientifically calculated carbon budget that has potential to limit global heating to 1.5 degrees above pre-industrial levels. It is intended to allow comparability of approaches from different actors within a common mitigation pathway based on climate science. As a base, the IPCC has published several papers on mitigation pathways compatible with 1.5-degree global warming^{33,34} the FLAG SBTi guidance was published in 2022³⁵ and the GHG Protocol land sector and removals guidance is due to be published 2023.

Sustainable finance taxonomies are also available, some of which cover agriculture, including the [Climate Bonds taxonomy](#), first launched in 2021, and the [Colombian Green Taxonomy](#), published in 2022. The People’s Bank of China (PBoC) has a taxonomy that includes guidance on green agriculture standards and classifications of certified activities.

The EU published its taxonomy in 2020 and, whilst it does not initially cover agriculture, work is under way to prepare technical criteria for the sector. The responsible Technical Expert Group (TEG)³⁶ has indicated that credible transitional pathways should be based on science and a consensus over mitigation or adaptation effects and wider agri-food system goals. Various other countries are developing criteria, including India, South Africa, Mexico and Singapore.

Other guidance frameworks are under development and soon to be published, including the GHG Protocol Agriculture criteria, Transition Pathway Initiative, Task force on Nature based Financial Disclosures (TNFD) and Global Reporting initiative (GRI) 13.

Whilst there are differences between the focus and categorisation of activities in respective taxonomies and standards, each help to provide stakeholders with greater clarity on the sustainability of transition activities.

Principle 3 **Offsets alone are not sufficient, and pathways should include scope 3 emissions**

Credible transition goals and pathways should not rely on offsets ahead of internal decarbonisation. Scope 3 emissions should be counted.

First and foremost, **entity transition pathways must be based on decarbonisation activities, rather than offsetting**. At the entity level, transition pathways should not consider purchased sequestration offsets from other activities (such as ‘natural’ carbon capture and storage solutions via agriculture, forestry, natural landscape restoration and ‘artificial’ carbon capture and storage solutions) as sufficient activities to meet a credible transition strategy. Offsetting reduces transparency and diverts attention away from reducing emissions. Only **once every technologically feasible decarbonisation avenue has been exhausted, the balance of remaining emissions may be offset**. As an example, a livestock farming entity would be expected to pursue livestock management decarbonisation measures before offsetting by planting forestry.

Scope 3 emissions, those stemming from bought and sold products, are highly prevalent in agri-food value chains. Firms are expected to consider scope 1 and 2 and upstream and downstream scope 3 emissions, based on reasonable expectations of traceability of upstream scope 3 and for company’s ability to control or influence downstream scope 3. Upstream scope 3 emissions are those related to purchased goods and services (i.e., within the supply chain). Whilst these are not within direct control by an agri-food entity, they are indirectly controlled by their purchasing decisions. Although sector fragmentation creates its challenges, not least current difficulties in traceability, sustainable sourcing is a valid expectation for any credible transition. By including Scope 3 emissions, the transition principles are reinforced along value chains, and by including the material emissions within the boundary of control scope 3, it offers a more comprehensive value chain assessment, fundamental for the agri-food sector to truly reach net zero emissions.

In 2021, British supermarket Tesco PLC issued a USD540 million SLB. Tesco chose a framework whereby it committed to pay a penalty if it fails to meet what appears to be an ambitious performance target (PT) – reducing its emissions by 60% by 2025 against its 2015 baseline and sourcing all electricity from renewable energy sources by 2030.

However, the 60% reduction PT includes only scope 1 and 2 emissions, whereas scope 3 emissions account for around 90% of Tesco’s overall carbon footprint.¹ The company has set a reduction target for Scope 3 emissions but did not include it in the deal.¹ In fact, its commitment to switch to 100% renewable power by 2030 merely follows UK government policy targets.¹ In this light, it may not seem quite so ambitious.

In the same way, a food manufacturer purchasing ingredients associated with deforestation would not be making a credible transition, even if their manufacturing process gave rise to zero emissions. Whilst sector fragmentation creates challenges in traceability, sustainable sourcing is a valid expectation for any credible transition.

Principle 4 **Technological viability trumps economic competitiveness**

Pathways must include current and expected technologies. Where a viable technology exists, even if expensive, it should be used to determine the decarbonization pathway for that economic activity.

This Principle is about setting **ambitious, technically feasible transition pathways** to maximise opportunities to reduce emissions and encourage innovation. To be of use, transition pathways must be viable as well as ambitious, or they will not incentivise change, but they must consider emerging technologies. This assessment of viability should not rule out technologically feasible options that are already in commercial use, even if they are expensive compared to business-as-usual. Short-term economic barriers to uptake can rapidly be addressed through appropriate incentives and support, as observed over the last decade in the renewable energy sector.³⁷ This sends a strong signal to all

stakeholders, including governments and other bodies that can catalyse change by addressing the economics.³⁸ These issues are particularly relevant to the agri-food sector, as highlighted in the following examples.

Technological developments are advancing in **precision farming**, a management approach that focuses on (near real-time) observation, measurement, and responses to variability in crops, fields, and animals.³⁹ Precision farming can help increase crop yields and animal performance, reduce labour costs, minimise waste by misallocation of resources and optimise process inputs. It can increase worker safety and reduce environmental impacts by reducing fertiliser and pesticide use, thus contributing to sustainable production and supporting a 'pathway to zero'. For more intensive fruit and vegetable production, **protected agriculture** in controlled environments and **vertical farming**, show similar potential. This all helps increase long term profitability and improves the efficiency of agricultural systems. These are good examples of how viable technologies can have a profound impact on transition, in response to a medium-term investment cost.

Important progress is being made in the development of **feed additives** to reduce enteric fermentation, which is a key source of methane emissions. Fully avoiding enteric methane emissions is not achievable in the short term due to the significant growth in the demand for ruminant products, but there are opportunities to substantially reduce emissions per unit of product, i.e., emission intensity. These opportunities generally consist of improving the efficiency of production via the implementation of known practices or technologies that result in greater yields per animal and per unit of feed, combined with reduced methane emissions.⁴⁰ Feed additives provide enormous potential, but research efforts must be intensified to create more effective compounds that radically reduce enteric fermentation if the livestock production is ever going to shift towards a 'pathway to zero'.

Green ammonia, as a substitute for the fossil gas based nitrogenous fertilisers, would be considered as an activity that would offer a 'pathway to zero'. Uptake of which could reduce 17% of food-related GHG emissions by source in the EU, while also reducing globally the reliance on the continued utilisation of fossil gases for fertiliser production.^{41,42} Specifically, even though green ammonia is currently less used and suffers smaller economies of scale, compared to traditional nitrogenous fertilizers, these should not be seen as a barrier to implementation, rather the technological viability should be the key determinant. The current energy and fertiliser supply crises may well catalyse market penetration.

Principle 5 **Action, not pledges**

A credible transition is backed by a clear plan rather than a commitment/pledge to follow a transition pathway at some point in the future. In other words, this is NOT a transition to a transition.

The essence of this principle is that action matters. Pledges, or even policies, procedures and governance practices, designed to align with the 1.5°C global warming limit, which influence and guide operating performance in the right direction, are not sufficient indicators of a credible transition because they can only provide an indication of intent. The focus needs to be on the **actual impact being delivered today**, and over the term of the investment, as determined by alignment with a credible transition pathway that meets transition principles 1-4. **Transition plans currently in the market have shown potential weaknesses and a divergence between pledges and action.**

There is a need for practical action to be taken to identify means to rapidly decarbonise activities and increase carbon sequestration. These should involve steps being taken to engage with suppliers and increase supply chain transparency and monitoring, clear commitments to due diligence and avoidance of commodities associated with land conversion, and early identification of value chain points where food loss and waste can be addressed for example. The necessary capital expenditure (CapEx) and operating expenditure (OpEx) investments should be identified, and action taken to earmark or raise the finance.

Linking to the previous principle, some leading agri-food firms have been criticised by market commentators for an over-dependence on offsetting rather than making credible decarbonisation efforts, or inconsistency around claims over the role of offsetting in their transition.⁴³ Firms that have publicly distanced themselves from the practice of offsetting, have been seen to proactively support their own brands to make use of offsets towards their carbon neutral

and climate positive claims; Unilever and Nestle plan to use and count such offsets as a method to achieve their long-term net-zero targets.⁴⁴ Scrutiny should be applied to companies’ overall sustainability claims in the agri-food sector and to the reliance on offsetting as the main method to achieve performance targets.

Agri-food entities often operate through long value chains, so extra efforts may be needed to verify that stated pledges are linked to action taken and followed through by themselves and entities under their direct control, from the outset.

4.2 Five Hallmarks for transitioning companies from an agri-food perspective

These principles are the basis for the “Hallmarks” framework, guiding the creation of credible and ambitious **transition plans at the entity level**. The Hallmarks aim to encourage companies to plan and deliver a transition that is rapid and robust enough to align with the Paris Agreement climate goal, as set out above in Principle 1, and to enable investors to identify these companies. The framework comprises **five Hallmarks for credible transition (see figure 4 above)**. Again, brief examples are provided to illustrate specific relevance for the agri-food sector.

Hallmark 1	<p>Paris aligned targets</p> <ul style="list-style-type: none"> • Select externally established sector-specific transition pathway aligned with 1.5-degree goal • Set company-specific performance targets (PTs) that align as early as possible with that pathway • In line with the Transition Principles above, the pathway and PTs must be science based, address all material emissions (scopes 1, 2 and 3) in the short, medium and long term, and restrict offsets to the ‘last mile’ of residual emissions
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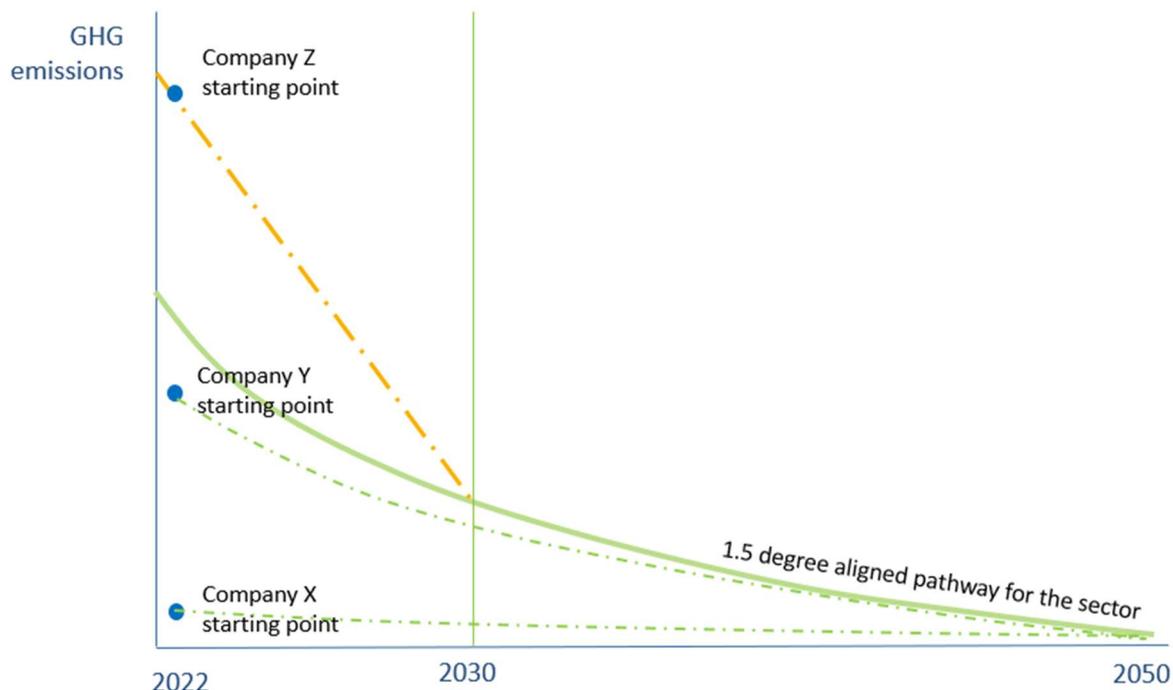
Hallmark 1 draws heavily from the five transition principles.

There are two elements to establishing Paris-aligned targets in the agri-food sector. First is through **the selection of a science based sectoral transition pathway**, in this case relating to the agri-food sector with the aim of aligning with a 1.5-degree trajectory, as per the Paris Agreement. This pathway does not simply reflect the agri-food sector average, or best-in-class, but an absolute, forward-looking pathway that is technologically feasible and ensures the agri-food sector aligns with overall transition goals. The science based nature of the pathway ensures that the emissions trajectories remain within the global carbon budget as estimated by the latest climate science from the IPCC. These pathways for agri food are now emerging from SBTi and will be further developed by Climate Bonds Initiative in 2023.

The second is the company’s selection of **specific performance targets (PTs)**. These describe how and when the company will catch up with, follow and outperform the aforementioned sectoral green transition pathway. Crucially, the PTs and associated performance levels must clearly articulate whether the company is currently on that agri-food specific transition pathway. If not, the company should indicate when they will align and continue to follow that pathway. These **performance targets will reflect the commitment, willingness and ability of the company to decarbonise**. To collectively achieve the global emissions reductions target, it is critical that decarbonisation is rapid and front-loaded and, therefore, those performance targets should align with the relevant agri-food green transition pathway.

The graph below provides an example of pathway alignment for three different companies GHG emissions levels, and their different respective starting points to a 1.5 degree aligned pathway for the sector, from 2022 to 2050. Company Z in the example is very GHG-intensive compared to companies Y and X and is not aligned with a 1.5 degree pathway in 2022. Therefore, to meet Hallmark 1 Company Z would require a more front-loaded and ambitious decarbonisation plan and changes to current activities in order to meet the pathway by 2030 (currently the cut off point for alignment in order to be considered credible). The transition plan would then need to show continuous ambition to stay on course with the 1.5 degree pathway through to 2050. Whereas Companies Y and X are example of companies that are already better than the 1.5 degree pathway, though would need to show they can maintain their position over time. Any corporate strategy would need to demonstrate adequate ambition to maintain this alignment through to 2050.

Figure 6: Illustrative example of hypothetical company decarbonisation transition pathways from 2022 to 2050, (Climate Bonds, 2022)



For effective performance target formulation, a firm needs to identify activities and measures that are ideally categorised as ‘near zero’ or on the ‘pathway to net zero.’ While these are still in formulation, consensus is starting to emerge over acceptable positive actions that can be taken in the sector. For example, a food manufacturer’s performance targets for 2030 could include: 50% of ingredients sourced from holdings practicing regenerative agriculture, reaching 100% by 2040; food loss and waste are reduced by 50% by 2030; 100% of commodity X shall be certified as sourced from deforestation-free production by 2030.

Performance targets formulation is also relevant for ‘interim’ or ‘stranded’ activities, so long as there are actions to transition away from these activities at a pre-agreed date. As per Principles 1-4 above, these targets and performance targets must address all material emissions including scopes 1, 2 and 3, ideally with both upstream and downstream emissions fully covered for the particular company context.

Entity transition is further strengthened by the inclusion of performance targets that consider agrifood system goals beyond climate, including **land use change, biodiversity, water use and quality, food loss and waste, circularity and just transition**. An assessment is conducted in Section 5 below.

Crucially, if a firm follows the correct approach to performance targets formulation, it creates a sound basis for the pursuance of the following Hallmarks.

Hallmark 2	<p>Robust plans</p> <ul style="list-style-type: none"> • Set the strategy and plan to deliver on performance targets • Prepare associated financing plan including cost estimates and expected sources of funding • Put in place necessary governance frameworks to enact change.
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For agri-food companies, the transition plan details how they will deliver the performance targets established through Hallmark 1. It should clearly state their current position, demonstrating an understanding of the sources of GHG emissions and the levers that can and will be pulled to address those, alongside other salient sustainability impacts of

their operations. For example, these may include impacts on land use change, soil quality, biodiversity, water quantity and quality and support to circular economy measures.

The performance targets of Hallmark 1 will only be credible if supported by a transition strategy and associated action plan that detail how the company will get from the current situation to where it needs to be. This should describe, qualitatively and step-by-step, the strategic objectives, orientations and policies, with particular emphasis on how the short-, medium- and long-term milestones reflected in the selected PTs will be reached. The plan should aim to break the timeline down into three to five year intervals, recognising that less detail will be possible towards 2050.⁴⁵ There also must be clear, board level commitment and ownership of the transition plan in order to drive forward change.

Furthermore, the plan should include the nature of changes to company activities undertaken to enable it to meet the PTs. For example, for the decarbonisation of activities, it may include progressive sourcing of energy from renewable sources and/or retrofitting existing buildings to improve energy-efficiency. Additionally, land use change performance targets might demand that supply chain sourcing is free from deforestation or damage to non-forest natural habitats and commits to cut ties with suppliers who are unable or unwilling to co-operate. To illustrate, a specific commitment to 'No deforestation, no (development on) peat and no exploitation' (NDPE) has been made by 30 leading agri-food businesses including ADM, BASF, Bunge, Cargill, Danone, Nestle, Unilever, Ikea, McDonalds, Mars and General Mills among others.⁴⁶ Entities should make clear the nature of the changes they are making to deliver against the selected PTs. These changes might be to:

- Decarbonise ongoing activities (e.g., through technology or efficiency improvements, or alternative inputs)
- Diversify activities and product mixes
- End activities that cannot be brought in line with net zero emissions goals, ideally via organic tail out or decommissioning
- Actions to address emissions and reduce environmental externalities of the supply chain both up and downstream of the business
- N.B. where options are unclear or none appear to be available, research and development plans should be clearly articulated.

A robust plan will define the actions needed to achieve the selected combination of environmental and/or social performance targets. Examples of actionable steps companies could undertake to meet these targets include the following:

- Technical plan for addressing the performance of sold products
- Human Resources plan for ensuring the right provision of skills e.g., changes to staff training
- Purchasing plan for supplier engagement e.g., renegotiation of supplier relationships
- Marketing and Sales plan for client engagement
- Business development plan for new business lines
- Supply chain engagement
- Comms and PR plan for policy engagement

In addition to the robust action plan for a company's transition, there should also be a qualitative assessment of delivery risks and a description of associated mitigate measures.⁴⁷

These actions should be accompanied by an associated financing plan because the aforementioned operational changes will have financing implications regarding the volume, timing and risk-return profile of finance needed to implement those changes. A financing plan is a tangible indicator of credibility in intent and ability to conduct the actions highlighted in the transition strategy; it provides assurance to existing financial backers that the company will remain profitable during the transition.

Hallmark 3 Implementation action

- The sourcing, use and impact of capital expenditure and operating expenditure.
- Cover and explain the other actions detailed in the strategy.

For a variety of reasons, there could be a lag between the establishment of the Transition Plan - selection of company-specific performance targets - and delivery against achieving those performances. It can take time to raise the finance, deploy it, and then have associated capital expenditure (CapEx) or operational expenditure (Opex) and 'bed in' activities sufficiently to deliver on the selected performance targets. For example, it would take time to adopt precision agriculture technologies and methods into the company's operations and the time to train and/ or redeploy staff to be able to operate it. Taking in these practical considerations, interim indicators of performance against the established performance targets can be important to gauge progress in the delivery. Taking in these practical considerations, interim indicators of performance against the established performance targets can be important to gauge progress in the delivery. These might include a full mapping of suppliers along the value chain as well as end users of goods in order to establish traceability of agri-food goods along the value chain.⁴⁸

One example of implementation action and recognising the time taken to achieve full traceability is from Louis Dreyfus Company, a major global agribusiness that set 100% traceability targets throughout their multiple value chains for different commodities. In 2015, they established an initiative to increase annually the traceability of their palm oil, sourced directly and indirectly from their suppliers up to 2020. From this, they made a year-on-year commitment to take action to ensure the total traceability increased annually which they managed, starting with 88% in 2016 to 97% in 2020, with the aim of closing this gap to 100% by 2023.⁴⁹ Through their efforts, they have undertaken that implementation action towards 100%, despite the initially inadequate capacity and internal infrastructure in 2015.

Hallmark 4 Internal monitoring

- Track performance against selected performance targets.
- Re-evaluate and recalibrate performance targets as needed

There are two components for companies to consider. The first is the **ongoing re-evaluation and recalibration of headline targets**. Selected targets should be regularly reviewed and recalibrated to reflect changing operating conditions and market developments such as new technologies coming online sooner than expected. Processes should be in place for such recalibration to tighten stringency where possible and to ensure continuous improvement overall.⁵⁰

It is particularly relevant to firms investing in emerging technologies to continually examine the latest climate impact innovations and regularly monitor whether they can increase the ambition of the performance targets in line with technological feasibility offered in the sector. For example, a food distribution company may include a re-evaluation of technological developments in low-carbon transport used in their logistics, which may include the adoption of hydrogen powered shipping and/or the use of electric powertrains for the transportation along the supply chain. One example of a first mover in low carbon transport and distribution in the agri-food sector is Kuehne+Nagel, a food logistics company who utilise innovation and technology through the use of alternative fuels, increased use of big data and predictive analysis and digitisation of booking system to increase productivity and efficiency of their operations to minimise waste and opportunity costs on the environment of their operations.⁵¹

The second aspect is through **tracking performance against selected performance targets**. The company should have processes in place to track performance against the selected performance targets, and to track delivery of the underlying actions to deliver those performance targets. This should include selection of appropriate tracking and estimation tools, including but not limited to GHG performance tools, and any equivalents for performance targets which are not expressed in terms of GHG emissions. This process acts as a feedback loop to Hallmarks 2 and 3.

Hallmark 5 External reporting

- External reporting and independent verification on the KPIs and strategy to deliver (per Hallmarks 1 and 2)
- Annual reporting of independently verified progress in terms of action taken and performance against targets (per Hallmarks 3 and 4).

Agri-food firms should publicly disclose their performance targets, their rationale, method of calculation and tools for performance tracking, as well as a narrative transition strategy, detailing changes that will be undertaken to deliver those targets. Up-to-date reporting is needed, at least annually, covering factors that drive performance. This is pertinent in agri-food due to production seasonality.

The requirements for external reporting require that agri-food companies publicly disclose the following information up-front:

- Selected target performance targets and the rationale for those performance targets, in line with the principles established e.g., relevance and materiality, scientific basis
- How those performance targets will be calculated (e.g., what emissions will be included) and the tools and mechanisms by which performance against those performance targets will be tracked
- The narrative transition strategy, detailing the changes the company will make to deliver the target performance targets

If disclosure is in connection to the raising of fixed-term finance, e.g., issuing an SLB, then particular emphasis should be placed on the performance targets and strategy over that term and also the long-term intent and forward momentum to achieve fully climate-aligned targets, particularly for agri-food companies with long-life assets or long-term transitions to make.⁵²

Furthermore, on an ongoing basis, entities should publicly disclose up-to-date information on performance against the selected performance targets, reporting at least annually, and including an explanation of the contribution of the main factors driving that performance, referencing the actions noted in the transition plan (Hallmark 2). If performance falls behind what is projected in the transition plan, information on corrective/ mitigating actions should be reported, along with plan revisions.

There is a final requirement for independent verification. The publicly disclosed information should be supported by a verification assurance report from an independent, external verifier with relevant expertise, such as an auditor or environmental consultancy. Currently, for agri-food SLBs, Second Partner Opinion Providers (SPOs) have been relied upon to date as the classifiers of sustainability for these bonds, as noted above. Certification from Climate Bonds Initiative approved verifiers are due to be developed in upcoming years.

5. Existing frameworks and initiatives

The Principles and Hallmarks provide a solid foundation for agri-food transition, centred on decarbonisation. However, the sector is deeply intertwined with the wider natural and social space and highly dependent on functioning ecosystems and regular weather patterns; it also provides incomes and livelihoods to billions of people.

As such, the **Transition Plan** framework we have presented above needs to be expanded to address agri-food's other key environmental and social challenges identified above: **land use change, biodiversity, water use and quality, food loss and waste, circularity and just transition**. This will help to shape a dedicated assessment tool for agri-business transition plans and criteria to assess procurement strategies; additionally, four sets of criteria with transition pathways will be developed, focusing on key subsectors where transition finance can have a crucial impact on agri-food transition.

Other initiatives are also working on defining ambitious agri-food transition system goals. In this section, we identify a selection of frameworks and consider commonalities with the Principles and Hallmarks discussed above to offer investors, policy makers and companies a clear vision of the necessary 1.5°C-aligned pathway(s) for the sector.

Some of the identified frameworks below also cover **land use change, biodiversity, water use and quality, food loss and waste, and just transition**; the latter incorporates human rights and labour standards, addressing social risks and opportunities and ensuring meaningful participation and partnership. There is emerging consensus that these additional goals are vital for agri-food systems transition. Table 2 provides an overview of the how various initiatives and frameworks align with Climate Bonds Principles and Hallmarks, as well as the additional agri-food system goals.

5.1 Ceres Investor Guide to Climate Transition Plans in the U.S. Food Sector⁵³

This report responds to the growing calls from investors for companies to provide credible transition plans in addition to their decarbonisation commitments. It is intended as a tool for investors to engage with companies in the food and agriculture sector to develop and disclose robust and ambitious climate transition plans. The consensus on what constitutes a credible transition plan is still emerging, but the report offers insights into the necessary components of such plans for the agri-food sector.

The report stresses that all three emission scopes (1, 2 and 3) must be disclosed by the company and contribute to meeting their science-based targets. It further discusses the varying spread of emissions across the various sub-sectors, for example hypermarkets. Science-based targets are presumed to reference the SBTi FLAG tool, discussed below. It does not explicitly rule out offsets or carbon credits for a company to disclose, but offsets should not be used to meet company targets. Rather, they should be used to account for residual emissions, or emissions beyond the company's value chain. This would align with Climate Bonds' principle of no offsets as this refers specifically to meet thresholds or targets for certification. It references the GHG Protocol, including for Land-Use Change (LUC) and deforestation, as well as corporate strategies to reduce or eliminate food loss and waste.

Unlike Climate Bonds, it does not explicitly recommend 'medium-term' targets, only short- and long-term. This could simply be an interpretation of the same requirements (i.e., long means medium). In any case, robust targets would cover regular time intervals between now and 2050 and beyond.

One further question that might be asked when reviewing existing frameworks is whether certain commodities are excluded or disappear towards 2050, as per the 'interim' activities mentioned in section 4. The Ceres report does not explicitly recommend the phasing out of commodities such as beef. However it suggests that such commodities may be at risk of becoming stranded asset classes. These commodities may thus fall under the category of interim or stranded economic activities captured in Figure 2.

Furthermore, companies with plans to increase production of these commodities should disclose how they intend to reduce the emissions profile of those products or shift investments to low-emission alternatives.

This report discusses regenerative agriculture. Various definitions of this practice exist, but the report refers to 'practices with potential to capture and store carbon in agricultural soils as a natural climate solution.' However, it further cites Roe et al. (2019) on the complexities determining this potential:

'the estimated soil carbon sequestration potential in croplands around the world ranges from 0.25 to 6.78GT CO₂ per year. To achieve the high estimate, farmers must double soil carbon on croplands from 0.27% to 0.54% through at least 20 years of continued soil management practices, including cover cropping, mulching, reducing tillage, agroforestry, rotational livestock grazing and others.'

This raises the question of whether a transition plan should include a pathway for improving soil sequestration. The high variability across a wide range of soils and conditions likely means a single pathway cannot be set. However, it could be explored how this can partner with or support other pathways.

5.2 FABLE Consortium Pathways to Sustainable Land-Use and Food System⁵⁴

The Food, Agriculture, Biodiversity, Land-Use, and Energy (FABLE) Consortium is a collaborative initiative to understand how countries can transition towards sustainable land-use and food systems. It is convened as part of the Food and Land Use Coalition (FOLU).

This report is targeted at higher-level strategies for individual countries, along with global targets. It therefore does not have the exact same scope of activity as Climate Bonds but provides many useful milestones and components that may be necessary parts of an agri-food company's transition targets and plans. For example, biodiversity and water use and quality targets are laid out in the report and there are frequent references to food loss and waste. Furthermore, a separate paper lays out pathways for biodiversity in greater detail.⁵⁵

These targets are global and take policy considerations strongly into account. The targets set out may therefore need interpreting in a different manner to accommodate Climate Bonds' principle of technological viability trumping economic viability. For Climate Bonds, if the solution exists to achieve the level of decarbonisation needed, policy or economic considerations should not act as a barrier to that. As such, while the level of ambition of the pathways aligns with a 1.5°C warming scenario, the speed of change to reaching a company's short-, medium- and long-term goals should reflect technological viability above all else.

5.3 The Science Based Targets Initiative (SBTi) Guidance for Forestry, Land and Agriculture (FLAG)⁵⁶

SBTi has provided guidance for company decarbonisation target setting for a range of sectors. As it is company-focused and is directed not only at FLAG but also commodity specific pathways, it has high relevance to Climate Bonds' work on agri-food systems. The FLAG guidance is now fully available for use by companies.

In terms of the scope of emissions addressed, there is strong (but imperfect) alignment with what Climate Bonds would want to see in emissions reduction targets. Scope 1 and 2 emissions must be included but scope 3 emissions need only be counted if they emissions represent 40% or more of a company's total emissions. However, it is expected that scope 3 emissions would form the largest proportion for most companies in the agri-food sector.⁵⁷ Nonetheless, even then only 67% of those scope 3 emissions must be counted under the guidance.

The SBTi guidance is aligned with a 1.5°C warming scenario and requires short-, medium- and long-term targets. At the FLAG sector level, it employs an absolute contraction approach, but, at the level of specific commodities, it uses a physical intensity convergence approach. The former provides challenges for Climate Bonds in the certification of whole companies, as it could penalise them for expanding their operations through mergers and/ or acquisitions, commonplace in any sector. For this reason, Climate Bonds has, until now, favoured physical emissions intensity pathways; this may need reconsideration for the agri-food sector due the breadth and variety of interlinked activities and associated variance of GHG-intensity involved throughout the respective value chains.

SBTi does not accept offsets as a means for a company meeting its targets.⁵⁸ Like Ceres, however, it allows for companies wanting to finance additional emission reductions *beyond* their science-based target (SBT) or net-zero target, like Climate Bonds. Unlike offsetting, which accounts for carbon sequestration outside the value chain or avoided emissions (which are also not accepted), a company may meet its targets through carbon removals within its value chain. This has been challenging until recently, without standardised methodologies for accounting a highly variable source of emissions reductions. However, the Greenhouse Gas Protocol Land Sector and Removals Guidance is expected early 2023 which will support SBTi's own methodology for accounting for carbon removals. This may also bring clarity for investors as companies will not be able to exaggerate their emissions reductions by pointing to carbon removals.

Importantly, SBTi has a component which requires a company to commit to zero deforestation along its value chain. However, it only *recommends* that companies meet this commitment 'as soon as possible.' Climate Bonds criteria may need to go further. SBTi recommends alignment of deforestation targets with the Accountability Framework initiative (AFi) guidance which reflects current best practice (discussed below). As for zero peatland and natural land conversion,

again, there are no strict requirements but SBTi recommends that companies set similar commitments to deforestation. It also notes that companies would be unlikely to meet their targets without meeting such objectives.

The guidance requires emissions from Direct Land Use Change (dLUC) to be counted. This is relevant to the recommendations of zero deforestation and conversion of other land uses. For example, peatland conversion would contribute to a company's emissions in this way. The inclusion of such emissions is crucial to capturing a company's full scope of emissions. As for Indirect Land Use Change (iLUC), these emissions are not required, only recommended. This is due to the high uncertainty in their estimation. Climate Bonds may consider ways to account for these emissions through other practices or criteria. Detailed guidance for the associated Science Based Targets for Nature (SBTN) is under development and expected to be published in 2023. This will provide companies with methodologies to assess and prioritise their impacts on nature and enable them to progress to setting targets on freshwater quantity and quality in the first instance⁵⁹.

5.4 EU Platform on Sustainable Finance Recommendations for Significant Contribution to Biodiversity⁶⁰

The EU Platform on Sustainable Finance (hereafter referred to as the EU Platform) has proposed green definitions for economic activities which substantially contribute to biodiversity. Previously, this has addressed climate mitigation and climate adaptation, respectively. However, these latest recommendations contain extensive considerations for crop production and animal production to have a positive effect on biodiversity.

A consensus view is building that, for agri-food systems to become fully aligned with the Paris Targets and reaching net zero, biodiversity should be considered in conjunction, not in isolation. The latest recommendations contain extensive requirements ranging from water use to diversified crop rotation and soil management for crop production, to grazing regime and supplementary feed for animal production. Within the realms of circular economy, food loss and waste are also referenced.

These definitions are targeted at specific economic activities rather than at the scale of a whole company or sector. Scaling up to requiring these practices across a company's whole operations adds considerable complexity to verification. However, with approximately 100 pages of criteria for biodiversity-positive production, it represents an obvious source for minimum or best practice safeguards for an agri-food transition framework. Despite being an EU initiative, the criteria are intended to be globally applicable.

5.5 International Capital Markets Association (ICMA) Principles for Sustainability Linked Bonds

ICMA does not deal directly with sectoral decarbonisation. However, as Climate Bonds is due to produce entity-level transition criteria, the credentials of both Sustainability Linked Bonds (SLBs) and green bonds will be addressed. **Two separate ICMA documents are relevant for this criteria development:**

*ICMA Climate Transition Finance Handbook (2020)*⁶¹

Cutting across both green bonds and SLBs, ICMA provides guidance for bond issuers in the nascent 'transition finance' space. This guidance recommends key indicators and information for issuers to include in their climate transition strategies. This includes:

- Relevant Paris-aligned, interim targets on the trajectory towards the long-term goal;
- Disclosure on the issuer's levers towards decarbonisation, and strategic planning towards a long-term target to align with the goals of the Paris Agreement;
- Clear oversight and governance of transition strategy; and,
- Evidence of a broader sustainability strategy to mitigate relevant environmental and social externalities and contribute to the UN Sustainable Development Goals.

It is important to note the distinction between Paris alignment and strictly 1.5°C alignment for the purposes of setting pathways. ICMA recommends that issuers set targets aligned with at least a 2°C warming scenario and ideally a 1.5°C warming scenario. This is Paris-aligned. However, the ambition of Climate Bonds criteria (as of 2021) is strictly 1.5°C alignment. There is therefore a risk that transition finance aligned with ICMA’s principles quantitatively do not align with the level of ambition required by Climate Bonds.

ICMA Principles for SLBs⁶²

Similar to the precursor Green Bond Principles, which are based on the Use-of-Proceeds model, ICMA has developed high-level, overarching principles which are *recommended* for all SLBs, which are based on the General Corporate Purpose model. ICMA does not address sector-specific principles. However, these Principles address the core components in the Hallmarks such as internal monitoring and external reporting and verification. Short-, medium-, and long-term targets (‘relevant interim targets’) are also advocated here, but as it specifies ‘ideally to 1.5°C and, at the very least, to well below 2°C’, this must be interpreted as not aligning with this hallmark.

Taken together, these sets of guidance will be relevant for Climate Bonds criteria. As for transition plans and actions on how the SLB’s Sustainability Performance targets (SPTs) will be reached, ICMA only recommend ‘where possible’ disclosure on these. This is less strict than what is proposed by Climate Bonds. They do not require the SPTs to be based on 1.5°C or be science-based.

5.6 The Accountability Framework Initiative (AFI) Core Principles⁶³

The AFI Principles set zero deforestation commitments and zero conversion of peatlands and any other natural landscape. These principles could potentially form the basis for similar criteria for companies. This extends to company supply chain compliance, as well as key monitoring and verification requirements. It also is one of the few frameworks which also addresses to some extent a Just Transition in the sector. This is done through principles for human and workers’ rights. Further to this, the AFI provides more detailed guidance on supply chain traceability for smallholders.

5.7 Agro-biodiversity Index (ABI)

Agricultural biodiversity is the diversity of crops and their wild relatives, trees, animals, microbes and other species that contribute to agricultural production; it results from millennia of interactions among people and the environment and it is a key component of healthy diets and human health. It is fundamentally interlinked with food biodiversity, which is crucial to fight malnutrition and diet-related diseases.

The Agrobiodiversity Index is tool that has been developed by Biodiversity International, part of the Consultative Group for International Agricultural Research (CGIAR).⁶⁴ It brings together data about the agrobiodiversity that people sell and eat, grow and conserve, and provides insights into food system functioning. The Agrobiodiversity Index measures biodiversity across three domains usually disconnected: nutrition, agriculture and genetic resources. It is an action-oriented tool that identifies policy and business levers, good practices and areas for improvements, risks and opportunities, to increase use and conservation of agrobiodiversity for sustainable food systems. Beyond biodiversity, it captures water use efficiency in agriculture.

5.8 Global GAP

The international standards certifier for good agricultural practice, GlobalGAP,⁶⁵ collaborates with producers, retailers, and other stakeholders from across the food industry to set standards for safe, socially and environmentally responsible farming practices. Their standards are predominantly aimed at Integrated Farm Assurance (IFA), applicable for fruit and vegetables, aquaculture, floriculture, livestock, and more. It offers what are referred to as ‘add-ons’ for sustainable irrigation and groundwater use, under its ‘SPRING’ programme, and for biodiversity in conventional agriculture.

5.9 International Standards Organisation (ISO)

ISO has a dedicated standard for water efficiency management systems, ISO 46001:2019,⁶⁶ which is applicable to a range of water use activities, including irrigation, heating, cooling and manufacturing. Its purpose is to assess and account for water use, and to identify, plan and implement measures to achieve water savings through the systematic management of water. Successful implementation depends on commitment from all levels and functions within the organisation, especially commitment by senior management.

ISO provides organisations with a framework to develop and implement a water efficiency policy through the establishment of objectives, targets, action plans, monitoring, benchmarking, and review programmes; these should consider any requirements related to significant water use.

ISO is also developing a standard on food loss and waste, ISO/TC34/SC20, which is due for publication in 2024.

5.10 Food Loss and Waste Standard (FLW)

The Food Loss and Waste Protocol⁶⁷ is a multi-stakeholder partnership, which has the mission of ensuring wide adoption of its Food Loss and Waste Accounting and Reporting Standard (or FLW Standard), so that operators and stakeholders are better informed about food loss and waste and motivated to curb this inefficiency. This is a global standard that provides requirements and guidance for quantifying and reporting on the weight of food and/or associated inedible parts removed from the food supply chain. Use of the standard enables countries, cities, companies, and other entities to develop inventories of how much FLW is generated and where it goes; these can underpin, inform, and focus strategies for minimizing FLW.

Minimizing FLW can provide economic benefits, enhance food security, improve natural resource use efficiency, and reduce environmental impacts. The purpose of the FLW Standard is to facilitate the quantification of FLW (what to measure and how to measure it) and encourage consistency and transparency of the reported data. The standard enables consistent quantification of baselines and tracking of progress toward Target 12.31 of SDGs and other targets.

5.11 SPHERE packing framework

The WBCSD's Sustainability in Packaging Holistic Evaluation for Decision-Making (SPHERE) framework⁶⁸ was created in response to the recognition of the environmental impact of packaging globally, going beyond purely life-cycle assessment (LCA) of GHG emissions to consider further issues such as plastic pollution and circularity issues. It is led by the World Business Council for Sustainable Development (WBCSD). The framework aims to support decision-making for packaging strategies spanning company departments. SPHERE aims to establish a balance between complexity and simplicity. By nesting all aspects of environmental packaging sustainability under a common framework, the framework looks to allow packaging designers, product portfolio managers and sustainability managers, among others, to utilise the framework to guide sustainability packaging design according to their own specific context.

The framework consolidates all the relevant and available information in one place, informing priorities for action and allowing for monitoring of performance and progress over time. SPHERE defines sustainability in packaging as maximum circularity and minimum environmental footprint, while avoiding the presence of harmful substances. There are six guiding principles to support this definition:

1. **Minimise the drivers of climate change** relates to the importance of minimizing the climate impacts of packaging.
2. **Optimize efficiency** considers product protection (meaning avoiding product damage, losses and waste).
3. **Optimize circularity** addresses the need to promote the use of recycled content and renewable content.
4. **Optimize end of life** designs for recyclability, taking into consideration effective end-of-life management schemes.
5. **Avoid harmful substances** limits present and future human health impacts due to leakage, ingestion and bioaccumulation.
6. **Minimize the drivers of biodiversity loss** currently accounts for water and land use; in the future, it can address measurements related to biodiversity impacts due to leakage.

The framework uses existing metrics and methodologies applicable to each guiding principle as its foundation. Although they acknowledge that there are some areas where metrics are missing or in development, the structure of the SPHERE framework allows for the integration of future methodologies where needed.

5.12 Just Rural Transition (JRT)

Just Rural Transition⁶⁹ provides a policy action agenda that sets out ‘pathways and actions that countries can take to repurpose public policies and support to food and agriculture, to deliver these outcomes and enable a just rural transition’. It aims to strengthen governance to manage trade-offs across different land uses, support indigenous and community land tenure, and deliver national economic, social, rights, health, and environmental goals which enhance long-term resilience of economies, communities, and ecosystems. JRT plans to announce core principles in late 2022.

6. Conclusions

Agri-food systems play a pivotal role in the transition to net zero, both in terms of climate change mitigation and adaptation. Sustainable finance can help facilitate the measures that need to be taken, but action is needed to ensure that investments are credible and avoid ‘greenwashing’.

Climate Bonds has developed a set of **Principles** and **Hallmarks**, which provide a robust framework for an ambitious and inclusive approach to transition. This is fully applicable to agri-food activities, whatever their position on the pathway to net zero, and it offers sound guidance for corporate transition planning.

Agri-food also delivers on several other vitally important environmental and social goals and so, a dedicated framework needs to be developed to provide comprehensive coverage. Therefore, as well as acting as the basis for initial engagement with agri-food transition finance stakeholders, the above analysis helps prepare subsequent activities in the Climate Bonds Agri-food systems transition programme.

Follow-up actions include:

- Drawing on the above findings, work will be conducted (in 2022/23) to form a robust and comprehensive sectoral **framework**, encompassing agri-food system goals beyond climate: land use change, biodiversity, water use and quality, food loss and waste, circularity in packaging, and just transition,
- This framework will be available for use by market actors to guide the creation of transition plans and assess the content and coverage of transition plans,
- The development of an **assessment tool** (2023) for agri food commodity supply chain sustainability,
- The development of four sets of Climate Bonds **sector criteria** (through 2023/24), focusing on key areas for agri-food transition finance.

Table 2 – Preliminary assessment of how existing frameworks cover transition principles, hallmarks and agri-food system goals (CB internal analysis, 2022)

	Criteria	Ceres	FABL	SBTi	EU	ICMA	AFI	ABI	GAP	ISO	FLW	SPH	JRT	CBI
Principles	In line with 1.5°C trajectory- short/med/long-term targets	●	●	●		○								●
	Established by science	●	●	●	○	●								●
	Offsets don't count	○		●	●									●
	Technological viability trumps economic competitiveness	○			○									●
	Action, not pledges	●			●	○	●							●
Hallmarks	Paris-aligned targets	●	●	●		●	○							●
	Robust plans	●				●	○							●
	Implementation action	●				●	●							●
	Internal monitoring			●		●	●							●
	External verification and reporting			●		●	●							●
Other agrifood system goals	Land Use Change (LUC) Emissions included within scope	●	○	●										*
	Zero deforestation across whole supply chain	●	●	●	●		●							*
	Zero peatland conversion across whole supply chain	●	●	○	●		●							*
	Zero natural land conversion across whole supply chain	●	○	○			●							*
	Biodiversity		●	●	●			●	●					*
	Water (use, quality)		●	●	●			○	●	●	○			*
	Food loss and waste	●	●		●							●		*
	Circular Economy									●			●	*
Just transition						●						●	*	

● explicitly incorporated into the framework; ○ partially or implicitly covered in the framework (e.g. AFI targets zero deforestation across supply chains without mentioning 1.5°C alignment); * under review in the Climate Bonds Agrifood Transition Programme.

Annex I - Transition categories: example activities and measures

Category	Economic activity	Measures to decarbonise economic activity	Measures to transition away from unsustainable activities
Near zero	Bioenergy generation from agricultural waste Landscape restoration (of deforested areas)		n/a
Pathway to net zero	Crop production Mixed farming systems Feed manufacture Food, drink and ingredients manufacture Logistics, supply/ cold chain Food retail/ grocery Catering	Climate-smart crop management (regenerative farming, agroforestry, precision tech, controlled environments) Post-harvest tech to reduce losses Supply chain transparency, traceability, responsible sourcing, due diligence Installation/ retrofit of energy efficient cold chain and processing facilities, eliminating HFCs / CFCs Reduce, recycle, re-use packaging Switch to renewable energy use Food waste reduction and processing Promotion of healthy diets	Move away from monocropping Avoid expansion of agricultural land Reduce the use of fossil fuel fertilisers and agrochemicals
Interim	Intensive Livestock breeding/ production	Climate-smart livestock management (regenerative, organic farming, agroforestry, precision farming) Anaerobic digestion	Switch to mixed farming systems with cropping and/or silvopasture
Stranded	Biofuel production Fossil fuel fertiliser manufacture		Phase out biofuel production Early decommission of fossil fuel fertiliser manufacture
Enabling	Farm advisory and extension services	Remote delivery through IT solutions	n/a

NB: The activities and measures shown are non-exhaustive and are not intended to convey ranking, significance or priority.

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