Climate finance to transform agri-food systems

Instruments, opportunities and challenges in the context of the European Union and Spain

November 2025

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Executive summary

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Climate finance is emerging as a potential driver of transformation in agri-food systems. Its scope covers all stages of the value chain, from production and processing to distribution, consumption and waste management, as well as related sectors such as energy, water and transport.

02/

The European Union and Spain have a broad and evolving financing architecture. Public programs such as the Common Agricultural Policy, LIFE, Horizon Europe and the Innovation Fund, together with national lines such as ICO Verde and the FES-CO_2 Carbon Fund, are complemented by private financing instruments such as green loans, sustainable bonds, agricultural insurance and climate philanthropy. This network of instruments offers opportunities to mobilize resources towards the socio-ecological transformation of the entire agri-food system.

03/

Despite progress, the effectiveness of climate finance remains uneven. Although the resources mobilized have increased, the results in mitigation, adaptation and ecological transition are still limited. The complexity of procedures, together with difficulties in accessing credit and a lack of coordination between instruments, reduces their real scope.

04/

Rather than offering definitive answers, this report invites collective reflection among all actors in the system. The aim is to promote open analysis of how different sources of climate finance can evolve to become true drivers of change capable of strengthening the sustainability, innovation and resilience of agri-food systems.

1. Introduction

1.1 International context of climate finance

Climate finance has evolved from an international aid approach to combating climate change to a structural component of the international economic regime in the pursuit of sustainable development. In its early days, climate finance emerged as an instrument designed to support countries with fewer resources in their efforts to address the consequences of climate change. This perspective was enshrined in the United Nations Framework Convention on Climate Change (UNFCCC), which established the *principle of common but differentiated responsibilities*. This principle states that the most industrialized countries must provide financial resources to support countries with less capacity in their actions to mitigate and adapt to the effects of climate change.

In this context, the Kyoto Protocol (1997) represented a significant step forward by incorporating so-called flexibility mechanisms, with the aim of making it easier for Annex I countries[1] to meet their emission reduction and limitation targets, while promoting sustainable development in non-Annex I Parties through the transfer of clean and efficient technologies (Ministry for Ecological Transition and Demographic Challenge [MITECO], n.d.). The establishment of the Clean Development Mechanism (CDM), the Joint Implementation Mechanism (JI) and Emissions Trading made it possible to channel capital towards projects aimed at reducing emissions in vulnerable countries, thus strengthening the mobilization of large-scale financial resources for climate action.

Subsequently, the Paris Agreement (2015) consolidated the role of climate finance in the international regime for combating climate change. It not only reaffirms the commitment of Parties with greater capacity to mobilize climate finance but also establishes the need to align all financial flows with a climate-resilient and low-emission development pathway (Article 2.1(c)).

In this way, climate finance is no longer conceived exclusively as a mechanism for international assistance, but rather as a structural component of the global economic transformation towards sustainability.

1 Annex I countries are those States that initially committed to taking on greater responsibilities in the fight against climate change due to their higher level of economic development and historical emissions. In the Kyoto Protocol, these countries made quantified and legally binding commitments.

1.2 Climate change, agri-food systems and geographical vulnerability

Climate change is now one of the main threats to the sustainability of agricultural activity and, by extension, to agri-food systems. It simultaneously affects the availability of natural resources and the stability of production, causing disruptions throughout global value chains. Sustained increases in temperatures, water scarcity and the recurrence of extreme weather events result in lower yields, loss of soil fertility and an increasingly resistant incidence of pests and diseases. From a systemic perspective, these phenomena impact all links in the system: they reduce farm profitability, damage ecosystems and increase exposure to food insecurity.

In particularly vulnerable regions, such as the Mediterranean basin, these effects are even more pronounced. In Spain, the combination of recurrent droughts, heat waves and increasingly irregular rainfall is accelerating desertification and the loss of fertile soil (Pérez Cimas, 2023). Added to this are rising sea levels in coastal areas, increased risk of forest fires and the spread of pests and invasive species, all of which increase the costs of adapting agri-food sector activity.

In turn, conventional agri-food systems contribute significantly to climate change. Their industrial nature, based on dependence on fossil fuels, intensive use of agrochemicals, expansion of monocultures and livestock concentration, has made food production one of the main sources of environmental pressure (Global Alliance for the Future of Food, 2022). Industrial agri-food systems are estimated to be responsible for approximately one-third of global emissions, as well as a substantial share of global energy and natural resource consumption (Pelekh et al., 2025).

Added to this is the waste of nearly 40% of the food produced each year globally, which amplifies the inefficiency of the system and exacerbates its environmental footprint (WWF Spain, 2024).

Against this backdrop, climate finance stands as a means to drive the transformation of agri-food systems towards more resilient and low-emission models. Directing financial resources towards adaptation and mitigation in the sector is key to reducing its vulnerability, strengthening economic, social and environmental sustainability, and accelerating the transition in particularly exposed territories.

1.3 Objectives, approach and methodology

The report aims to review the main sources of climate finance, both public and private, with the potential to impact the transformation of agri-food systems in the European Union and Spain. It identifies how resources are being mobilized towards the sector and highlights challenges and opportunities for adjusting the climate finance architecture.

To this end, a documentary review of academic, technical and regulatory literature is carried out, complemented by 10 semi-structured interviews with experts from non-governmental organizations, research centers, companies in the sector and public administrations. This qualitative approach integrates diverse evidence and perspectives and offers a comprehensive view of the dynamics, gaps and potential of climate finance in the process of transforming agri-food systems.

2. Conceptual framework

2.1 What do we mean when we talk about climate finance?

Given that it is an open and constantly evolving concept, the definition of climate finance has generated various conceptual discussions (Galbiati et al., 2023). This report takes as its reference the operational definition proposed by the UNFCCC, according to which climate finance encompasses all local, national and transnational financing mechanisms, from public, private or alternative sources, that support adaptation and mitigation measures to address the effects of climate change. Furthermore, it should be noted that this report adopts a broad definition: it also identifies sources that, even if not exclusively aimed at adaptation or mitigation, are likely to contribute to these objectives and drive the transformation of agri-food systems.

Climate finance is essential to significantly reduce greenhouse gas (GHG) emissions and, at the same time, to support society's adaptation to the impacts of climate change. Ultimately, it seeks to reduce vulnerability and strengthen the resilience of socio-ecological systems, contributing to the fulfilment of the Paris Agreement commitments.

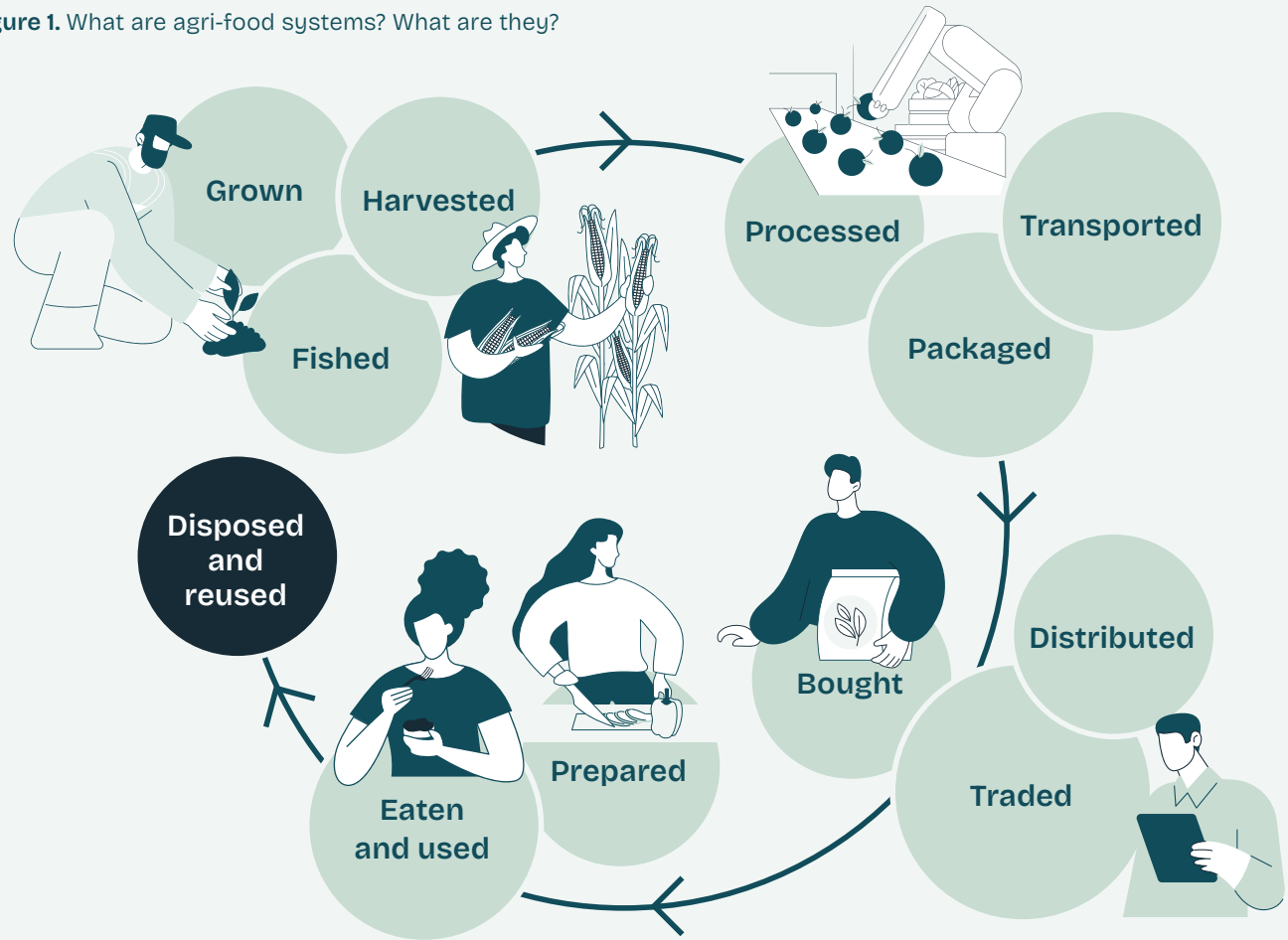
Currently, climate finance can be provided through various financial instruments and cover a wide range of sectors—energy, transport, construction, agriculture and livestock, industry, forests, water, health and tourism—as well as cross-cutting activities such as research, education, awareness-raising, governance and the transfer of environmental innovations (MITECO, 2023).

2.2 The agri-food sector from a systemic perspective

To adequately reflect the complexity of the interactions between the subsectors of the agri-food chain, this report adopts a systemic, holistic, relational and dynamic approach, in line with the recommendations of the Food and Agriculture Organization of the United Nations (FAO), the International Fund for Agricultural Development (IFAD), the United Nations Children's Fund (UNICEF), the World Food Program (WFP) and the World Health Organization (Climate Policy Initiative [CPI] and Food and Agriculture Organization of the United Nations [FAO], 2025).

From this perspective, the agri-food system is understood as the set of activities, actors, investments and decisions involved in the production, processing, distribution, consumption and waste management of agricultural and food products, as well as non-food products that sustain livelihoods. (see **Figure 1**). Agri-food systems operate within broad economic, social, political, cultural, geographical and environmental contexts, integrating institutions, governance mechanisms, actors, technical capacities and infrastructure, as well as ecosystems that influence their functioning. This systemic approach allows for the identification of complex interactions and feedback between system components that influence sustainability, resilience and human well-being throughout the value chain (ClimateShot Investor Coalition [CLIC], 2025).

Figure 1. What are agri-food systems? What are they?



Source: FAO (2025)

2.3 Climate finance for agri-food systems

From a systemic perspective, climate finance for agri-food systems is understood as capital investment in climate-related initiatives that encompass not only agriculture, forestry and fisheries, but also the entire agri-food value chain, from production and industrial processing to distribution, consumption and waste management. It also includes activities linked to sectors such as energy, transport, water and industry (CLIC, 2025), which are essential for driving systemic change and the transition to more sustainable and resilient agri-food systems.

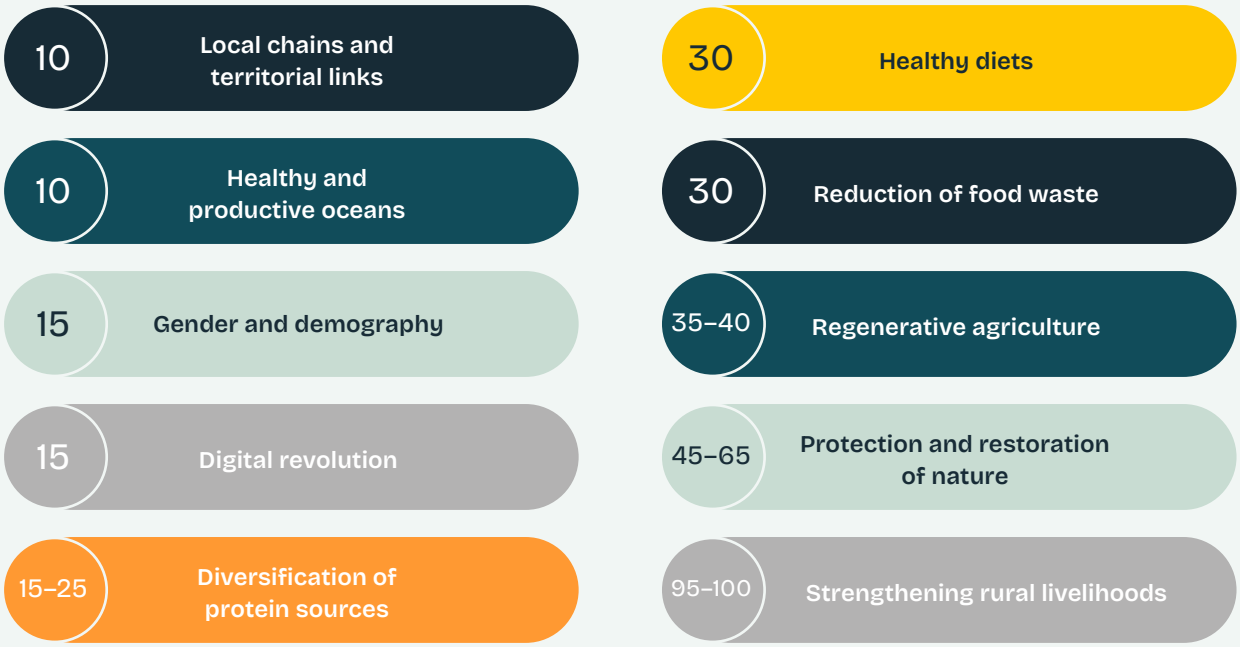
In this context, the global multi-stakeholder coalition The Food and Land Use Coalition (FOLU) proposes a roadmap for achieving a comprehensive transformation of agri-food systems by 2030, to respond to the main current climatic, environmental, social and economic challenges.

Based on ten critical reforms or transitions, this proposal requires a profound reorientation of financial flows towards regenerative, inclusive and circular production models.

According to FOLU's methodology, achieving these reforms requires an estimated additional annual investment of between 300 and 350 billion US dollars (USD) until 2030, mainly directed towards sustainable agricultural practices, healthy diets, ecosystem restoration and food waste reduction.

Figure 2 illustrates the approximate distribution of this additional annual investment per reform, reflecting the scale of the effort required for a systemic and holistic transformation of the global agri-food system

Figure 2.
Annual financial investment needs for the transformation of agri-food systems until 2030, measured in billions of US dollars (USD).



Source: Prepared by the authors based on data from The Food and Land Use Coalition (2019).

3. Public sources of climate finance

Public sources of climate finance are understood here as resources from public administrations intended to support climate change mitigation and adaptation, as well as the transition to more sustainable production models. This section addresses those sources that have an impact on agri-food systems, both at the European Union and Spanish levels.

3.1 Public climate finance instruments in the European Union

The selected programs are presented following the structure of the Multiannual Financial Framework (MFF) 2021–2027, which organizes the Union's budget into headings. This report analyses some of the most relevant climate finance initiatives for the transformation of agri-food systems located in three of these headings—'Single Market, Innovation and Digital Economy'; 'Cohesion, Resilience and Values'; and 'Natural Resources and Environment'—together with certain Union instruments that operate outside the MFF.

Financial instruments included in the Multiannual Financial Framework

Heading 1: Single Market, Innovation and Digital Economy

Horizon Europe (HE) Program

With a total budget of €93.5 billion for the period 2021–2027, Horizon Europe is the European Union's framework program for research and innovation and the successor to Horizon 2020. Its aim is to transform scientific knowledge into concrete solutions to major global challenges. Through its Cluster 6 ("Food, Bioeconomy, Natural Resources, Agriculture and Environment"), the program promotes the transition of agri-food systems by funding Research and Innovation Actions (RIA), Innovation Actions (IA) and Coordination and Support Actions (CSA). These may include living labs and full-scale demonstrations; exchange networks or initiatives aimed at strengthening agricultural innovation systems. This is complemented by Cluster 5 ("Climate, Energy and Mobility"), with which it shares climate action objectives. From a climate finance perspective, HE contributes to mitigation and adaptation objectives through grants for research projects that reduce emissions, strengthen resilience and promote the decarbonization of the agri-food chain. This is achieved through agroecological practices, nature-based solutions and food waste reduction, among other lines of action (European Commission, 2025b).

EIT Food

This is a Knowledge and Innovation Community (KIC) of the European Institute of Innovation and Technology (EIT), established with the aim of transforming the European food system. The EIT, of which EIT Food is a part, has a budget of close to €3 billion for the period 2021–2027, funded through the "Innovative Europe" pillar of the Horizon Europe program. EIT Food is a pan-European network that brings together companies, universities, start-ups and public administrations to act through four axes: innovation, education, entrepreneurship and public engagement (EIT Food, 2024). Its support mechanisms include incubation and acceleration programs, investment in start-ups and training programs.

Heading 2: Cohesion, Resilience and Values

The European Union's cohesion policy funds for the period 2021–2027 channel investments co-financed by the European Union and the Member States. Their aim is to reduce territorial inequalities, strengthen competitiveness and promote the transition to a zero-emission economy (Ministry of Finance, 2024). Two of these are particularly noteworthy:

European Social Fund (ESF+)

With a total budget of €226.05 billion for the period 2021–2027, the ERDF finances research, development and innovation and technology transfer activities, as well as the improvement of production processes, the digitization of SMEs and public services, energy efficiency, the promotion of renewable energy use, the energy renovation of buildings and, depending on the operational program, sustainable mobility. The ERDF focuses its action, as a priority, on reducing territorial inequalities and promoting the development of the most disadvantaged European regions.

Fondo Social Europeo Plus (FSE+)

With a budget of €99.26 billion for the period 2021–2027, the ESF+ finances measures for employability, training and retraining, social inclusion and green and digital skills, with a focus on vulnerable groups, to ensure the implementation of the European Pillar of Social Rights.

In the agri-food sector, these funds can support the modernization and reduction of the carbon footprint of companies in the sector, provided that such actions are included in the relevant programs, while promoting the development of the technical skills needed to advance the green transition.

Heading 3: Natural Resources and Environment

Common Agricultural Policy (CAP)

Although the CAP is not a budgetary instrument but a policy, its financing is organized through two funds included in this heading: the EAGF for Pillar I interventions and the EAFRD for Pillar II interventions. For the period 2023-2027, its objective is to promote a more sustainable and resilient agricultural system capable of ensuring food security, driving climate action and strengthening the socio-economic fabric of rural areas (La Moncloa, 2025). Its architecture is structured around two complementary pillars and is managed through National Strategic Plans, which give Member States greater responsibility and flexibility in achieving results.

PILLAR I— DIRECT PAYMENTS AND MARKET MEASURES

Pillar I of the CAP comprises interventions financed entirely by the **European Agricultural Guarantee Fund (EAGF)**, which has a budget of €291.09 billion for the period 2021–2027. It is the main instrument for annual agricultural income support, aimed at ensuring fair incomes, promoting territorial cohesion and supporting strategic sectors in rural areas.

Direct payments are annual subsidies granted to farmers and livestock breeders who meet the requirements of enhanced cross-compliance (Spanish Agricultural Guarantee Fund [FEGA], 2025). In Spain, these payments include the following interventions:

- Basic income support for sustainability
- Complementary redistributive income support for sustainability
- Complementary income support for young farmers
- Production-related income support (agricultural and livestock)
- Specific payment for cotton cultivation
- Eco-schemes: These are direct payments aimed at promoting agricultural practices that are beneficial to the environment. They are linked to the voluntary adoption by farmers of agri-environmental practices related to carbon farming and agroecology, with the aim of improving soil structure and fertility, increasing its carbon content, reducing erosion and desertification, decreasing GHG emissions and promoting biodiversity in agricultural ecosystems, as well as conserving landscape and natural resources (FEGA, 2025). In Spain, the CAP Strategic Plan (PEPAC) includes nine eco-schemes, each focusing on different sustainable practices adapted to the different types of agricultural land and agroclimatic conditions in the country.

Market measures are market interventions integrated into the Common Organization of Agricultural Markets (CMO), whose objective is to prevent crises, stabilize prices and improve farmers' performance in the food chain. These interventions may include public intervention or storage mechanisms, as well as sectoral programs.

PILLAR II— RURAL DEVELOPMENT

Pillar II is the rural development instrument of the CAP and is financed through the **European Agricultural Fund for Rural Development (EAFRD)**, which has €95.51 billion available for the period 2021–2027, together with national and regional contributions. Its purpose is to promote innovation in rural areas, supporting the transition to more competitive, resilient and climate-friendly agricultural models.

Through grants and financial instruments such as loans, microcredits and guarantees, Pillar II supports financially viable projects aligned with the EAFRD's priority axes (fi-compass, 2025). These include the sustainable management of natural resources, investments in agricultural holdings, forestry and the transformation of the agri-food value chain, as well as training, advice and knowledge transfer, innovation and cooperation through the Operational Groups of the European Innovation Partnership for Agricultural Productivity and Sustainability (EIP-Agri).

LIFE Program

With a budget of €5.43 billion for the period 2021–2027, the LIFE Program is the European Union's financial instrument dedicated exclusively to supporting environmental and climate action projects. Created in 1992, it supports the practical implementation of EU environmental strategies and is currently aligned with the objectives of the European Green Deal. The program is structured around four pillars: Nature and Biodiversity; Circular Economy and Quality of Life; Climate Change Mitigation and Adaptation; and Clean Energy Transition (European Commission, 2021). Within this framework, the Climate Change Mitigation and Adaptation strand manages around €905 million, which is earmarked for promoting projects with demonstrative and replicable value, aimed at generating measurable environmental and climate impacts, through action grants, operating grants and other combined financial mechanisms (MITECO, 2025a). In the agri-food sector, LIFE supports projects for sustainable soil and water management, low-carbon agriculture and the conservation of agricultural biodiversity, thus contributing to the ecological transformation of the European agri-food system.

Financial instruments outside the Multiannual Financial Framework

In addition to the programs financed under the Multiannual Financial Framework, the European Union has certain instruments that operate outside the regular budget. These include the EU Innovation Fund and the Social Climate Fund, both of which are financed by revenues from the emissions trading scheme. Although they are not included in any MFF heading, they are important sources of public funding for climate action and complement the initiatives included in the European budget.

Innovation Fund

The Innovation Fund is a financial instrument whose total funding volume depends on the price of carbon and could reach around €40 billion between 2020 and 2030, based on a price of €75/tCO_2. This fund promotes the demonstration and commercial deployment of low- or zero-carbon technologies with a special focus on the industrial and energy sectors, and does so through calls for grants and competitive auctions (European Commission, 2025a). In the agri-food sector, it can become a source of funding for projects that fit its calls for proposals, such as those aimed at decarbonizing processing plants or improving energy efficiency and industrial refrigeration systems, thus contributing to bringing solutions that are currently considered high risk for investment to commercial scale. One example of this is LuGaZ, a project developed in Spain that creates a zero-waste facility to recover manure and by-products from the agri-food industry—especially the dairy sector—through the production of biogas, biomethane and biofertilizers, demonstrating the potential of the Innovation Fund to support the climate transition in this sector as well.

Social Climate Fund (SCF)

This is a financial instrument designed to mitigate the social effects of carbon pricing on the most affected sectors. It will become operational in 2026 and will operate until 2032, with the aim of ensuring a just transition through

i) temporary income support for vulnerable households, micro-enterprises and transport users; and

ii) structural investments in energy efficiency in buildings, clean heating and cooling, integration of renewable energies and zero- or low-emission mobility (European Parliament, 2022; MITECO, 2025b).

Although it does not directly finance agricultural practices, the fund could indirectly benefit agri-food systems by reducing energy and transport costs for micro-enterprises and businesses in the sector. In addition, together with a mandatory contribution of 25% from Member States to their Social Climate Plans, the SCF is designed to mobilize at least €86.7 billion in public funding during the period 2026-2032.

3.2 Public climate finance instruments in Spain

At the Spanish level, this section is structured around the main public instruments that channel climate finance towards the transformation of agri-food systems. To this end, it analyses the initiatives promoted by the institutions that concentrate most of these resources: the Ministry of Agriculture, Fisheries and Food (MAPA), the Ministry for Ecological Transition and Demographic Challenge (MITECO), the Institute for Energy Diversification and Saving (IDAE), the State Agricultural Guarantee Company (SAECA), the Official Credit Institute (ICO) and the National Innovation Company (ENISA). Together, these bodies coordinate subsidy programs, credit lines, guarantees, emissions compensation mechanisms and innovation support instruments that directly or indirectly impact climate change mitigation and adaptation within the Spanish agri-food system.

Before analyzing the specific state instruments, it is necessary to place them within the general framework of the Recovery, Transformation and Resilience Plan (PRTR), through which Spain channels European funds from the Recovery and Resilience Facility (MRR), the main financial pillar of NextGenerationEU. In practice, the PRTR constitutes the main strategic framework for public funding for the ecological transition, as it allocates more than 37% of its resources to climate objectives. Within the plan, Component 3, "Environmental and digital transformation of the agri-food and fisheries system", stands out, promoting investments in irrigation modernization, energy efficiency, digitization of the primary sector, support for the agri-food industry and strengthening sustainability throughout the value chain. This component has a total estimated investment of €2.06 billion, of which €1.46 billion comes directly from the MRR, underlining its importance within Spain's recovery and green transition efforts. Two strategic projects (PERTE) are particularly relevant: the PERTE Agri-Food, aimed at modernizing and digitizing the food system, and the PERTE Circular Economy, which includes specific lines for the recovery of by-products, waste reduction, the implementation of renewable thermal energies and the decarbonization of industrial processes, including the food industry.

Ministry of Agriculture, Fisheries and Food (MAPA)

Plan for the renewal of the National Agricultural Machinery Fleet

The PLAN RENOVE is aimed at renewing the agricultural machinery fleet in Spain, with the aim of reducing emissions of nitrogen dioxide, particulates and other polluting gases, as well as reducing diesel consumption. The subsidies granted must be used to purchase new equipment and machinery, such as tractors, self-propelled, trailed or suspended machinery, as well as tanks with localized slurry application systems and their accessories, which will replace equipment of the same type that must be withdrawn and scrapped. From 2025, the program also provides for aid for the purchase of precision farming equipment, with the aim of improving farm efficiency (Extensión Agraria Digital, 2025). In this way, the plan promotes the transition to more sustainable and resilient agri-food systems, encouraging the adoption of clean technologies, minimizing the environmental impact of agricultural activity and improving occupational safety in the sector.

ICO-MAPA-SAECA financing line

This financing instrument is intended to offer financial support to farm owners, as well as operators in the fisheries and aquaculture sector up to the age of 40, to cover the general needs of their activity. Its objective is to mitigate the loss of profitability resulting from drought and other adverse climatic phenomena by facilitating access to credit on favorable terms. In addition, this line contributes to promoting generational renewal in rural areas, encouraging the incorporation and consolidation of young professionals in the agricultural and fisheries sectors (Sociedad Anónima Estatal de Caución Agraria [SAECA], 2024).

Supra-regional Operational Groups

These are multi-stakeholder alliances made up of different actors in rural areas, such as farmers, cooperatives, research centers, civil society organisations and other entities that collaborate in the design and implementation of innovative projects of general interest with a scope of action in two or more autonomous communities. Promoted by the AEI-Agri, these groups aim to drive innovation to modernize the agri-food and forestry sector, promote knowledge exchange, encourage digitalization and contribute to improving productivity, innovation and sustainability in

all its dimensions (EIP-AGRI Support Facility, 2020). Although they are not considered a climate fund in the strict sense, they channel resources from the EAFRD, which allows for the financing of initiatives aligned with the climate and environmental objectives of the CAP. In addition, many of the projects developed by these groups are related to efficient water management, emissions reduction, the circular economy, biodiversity and renewable energies. In this sense, the AEI-Agri Operational Groups act de facto as a climate finance instrument that contributes to climate change mitigation and adaptation in agri-food systems.

Ministry for Ecological Transition and Demographic Challenge

Calls for proposals from the Biodiversity Foundation
A state-owned public sector entity attached to the Ministry for Ecological Transition and Demographic Challenge (MITECO), it acts as an environmental and climate financing instrument by managing calls for competitive grants. These calls are aimed at supporting projects that contribute to the conservation and restoration of ecosystems, the protection of biodiversity, adaptation to climate change and the promotion of a sustainable bioeconomy.
In summary, its objectives are

(i) the recovery and conservation of natural capital as the basis for socio-economic development,

(ii) the mitigation of and adaptation to climate change in sectors dependent on natural resources,

(iii) promoting the ecological transition of the economy, and

(iv) encouraging the creation of green jobs and innovation in the environmental field.

In this regard, the entity also promotes actions aimed at strengthening the resilience of food systems, supporting responsible production models and promoting the circular economy, considered the key tool for advancing the decarbonization of the Spanish food system (García et al., 2024).

Carbon Fund for a Sustainable Economy (FES-CO_2)
Created in 2011, this is a state climate finance instrument aimed at promoting a low-carbon and climate-resilient economy. Its main objective is to contribute to the fulfilment of national emission reduction commitments, while promoting technological development and the modernization of key economic sectors (TRINOA, 2023). Through this fund, MITECO acquires verified reductions in emissions generated in Spain, known as carbon credits. In this way, projects that succeed in reducing their CO_2 emissions can receive financial compensation for each ton of carbon avoided or captured. Overall, the Fund is establishing itself as a strategic tool within Spanish climate action, acting as an economic incentive for those who develop emission reduction projects.

Institute for Energy Diversification and Saving

The Institute for Energy Diversification and Saving (IDAE) is a public body whose main mission is to contribute to the fulfilment of Spain's objectives in the areas of energy efficiency, renewable energies and low-carbon technologies.

To achieve these goals, the IDAE develops various training and technical advisory activities, promotes support and financing programs for innovative and replicable technological projects, and actively participates in European and international cooperation initiatives. It also supports the development and consolidation of technologies aimed at decarbonizing electricity generation.

Among its funding lines, the "Aid program for energy efficiency measures in agricultural holdings" stands out, which was launched in response to the increase in energy demand in the Spanish agricultural sector over the last two decades (TVidae, 2022).

The program sought to reduce energy consumption through measures such as the renovation of facilities, including heat generators, air conditioning systems, lighting, pumps and other consumer equipment, as well as the replacement of conventional sources with renewable thermal energies such as solar thermal, biomass, waste utilization, geothermal energy or aerothermal and hydrothermal heat pumps. The objective was to achieve a reduction in energy consumption of up to 30%, following the roadmap set out in the first National Integrated Energy and Climate Plan 2021-2030 (PNIEC).

The funding was directed at two main actions:

- Improving energy efficiency in irrigation facilities.
- Improving energy efficiency and the use of renewable energies in agricultural holdings.

This program, which ran until 31 December 2023, is no longer active, but it is a notable example of a climate finance tool with a significant impact on the energy transition of the Spanish agricultural sector, as it promoted the adoption of technological solutions aimed at energy efficiency, reducing final energy consumption and integrating renewable sources into production processes.

State Agricultural Guarantee Company (SAECA)

The State Agricultural Guarantee Company (SAECA), a public company created in 1988, aims to facilitate access to financing for the primary sector by granting guarantees and sureties that allow farmers, livestock breeders, cooperatives and agricultural entities to obtain credit on more favorable terms. In this way, SAECA contributes to promoting investment in the agricultural, livestock, forestry, fisheries and agri-food sectors, as well as in actions to improve the rural environment, aimed at maintaining, modernizing and optimizing farms (Garrido et al., 2014), in addition to covering liquidity and working capital needs.

Its main activity consists of offering financial guarantees to individuals or legal entities, public or private, for operations aimed at strengthening the competitiveness and sustainability of the rural environment. The entity pays special attention to applications from small and medium-sized producers, also supporting the splitting of agricultural and livestock insurance premiums to improve climate and economic risk management on farms. In addition, SAECA plays an important role in supporting the agricultural policies of the various administrations, both at the national and regional levels.

SAECA's main financial products include the Investment and Working Capital Line, the Centralized Portfolio Guarantee Management Financial Instrument (2023-2027), the Agroseguro Line, the Irrigation Communities Line, the lines with MAPA counter-guarantees and those specific to the fishing sector (Fishing-Investment and Fishing-Working Capital), as well as the joint ICO-MAPA-SAECA lines, aimed at young farmers and recovery after extreme weather events, such as the DANA that took place in October 2024.

Through its guarantees, SAECA acts as a facilitator of climate finance for sustainable agricultural projects, such as efficient irrigation or drones for crop control. In addition, they plan to implement new specific guarantee lines for organic farming, agroforestry and conservation agriculture, with the aim of promoting practices that mitigate climate change and regenerate ecosystems (SAECA, 2025).

Official Credit Institute

The Official Credit Institute (ICO) is a public business entity attached to the Ministry of Economy, Trade and Business, whose activities are aimed at promoting business growth and boosting the ecological and digital transition of the Spanish economy.

The ICO also acts as a key instrument for channeling funding linked to the Recovery, Transformation and Resilience Plan (PRTR), within the framework of the NextGenerationEU funds.

Among its most notable initiatives is the ICO MRR Green Line, designed to promote projects that contribute to the energy transition, the decarbonization of the economy and adaptation to climate change.

This line aims to finance investments aligned with the European Union's climate and environmental objectives, such as energy efficiency, renewable energies, sustainable transport, industrial decarbonization, efficient water management and the circular economy (see **Figure 3**).

Self-employed individuals, private companies of any size and households are eligible for this financing, which can cover up to 100% of the eligible investment cost, excluding VAT. Projects must comply with the principle of no significant harm (DNSH) and demonstrate their effective contribution to climate action, in accordance with the green labelling of the Recovery and Resilience Facility or MRR (ICO, n.d.). This labelling is based on the methodology set out in Annex VI to Regulation (EU) 2021/241, which defines the climate and environmental contribution coefficients applicable to investments financed by the RRF. These coefficients make it possible to identify and quantify the portion of resources that effectively contributes to climate change mitigation and adaptation objectives, in accordance with the criteria of the European Union taxonomy (ICO, n.d.).

Overall, the ICO MRR Green Line is one of the main climate finance instruments at the state level, as it mobilizes public and private resources towards sustainable investments that contribute to reducing emissions, saving energy and the green transformation of productive sectors, including agri-food.

Figure 3. Thematic categories into which eligible projects under the ICO MRR Green Line can be classified.

Source: Consultation tool

National Innovation Company

The National Innovation Company (ENISA) is a public entity created in 1982, currently attached to the Ministry of Industry and Tourism, whose mission is to support the growth, modernization and competitiveness of Spanish SMEs by financing innovative technological projects through participatory loans. Since its foundation, ENISA has established itself as a strategic player in the Spanish entrepreneurial ecosystem by facilitating access to financial instruments for innovative companies with potential for transformation and growth (Emprendedores, 2025).

Among the different lines of financing it manages, AgroInnpulso stands out, an initiative developed in collaboration with MAPA in the wake of the COVID-19 crisis. This line aims to promote the transformation of the agri-food sector by encouraging the incorporation of digital technologies that improve the efficiency, sustainability and competitiveness of SMEs (SEA Empresas Alavesas, 2022). Specifically, it is aimed at innovative companies operating in any link of the agri-food value chain that integrate digital tools into their products, services or processes.

Through AgroInnpulso, ENISA promotes the digitalization of the agri-food sector, facilitating the adoption of technological tools that optimize resource management, improve energy efficiency, reduce waste and strengthen traceability and transparency in production processes. Although AgroInnpulso is not formally classified as a climate finance instrument, its approach and the environmental criteria it incorporates generate indirect positive impacts on sustainability, rural development and the adaptation of the agri-food sector to environmental challenges (Rondan Justribó, 2025).

4. Private sources of climate finance

This section examines the main private sources of climate finance that can drive the transformation of agri-food systems, grouping them according to their operating logic and the type of capital they mobilize.

First, it addresses traditional financial intermediaries, represented by commercial banks, which channel credit towards green investments through loans, *leasing* or project financing. Secondly, it analyses specialized investment vehicles, such as sustainable investment funds, which provide venture capital or equity capital to scale up technologies and business models with a climate impact. Next, it includes a hybrid instrument—agricultural insurancet—which, although it does not directly finance investments, plays an essential role in transferring climate risk, enabling producers and companies to undertake investments in adaptation and resilience. Two market mechanisms are also examined: voluntary carbon markets, which generate climate revenue through the sale of CO_2 credits, and green bonds, which allow companies and entities to issue debt specifically earmarked for projects with verifiable environmental benefits. Finally, climate philanthropy is addressed, characterized by providing capital without expectations of return, making it a strategic lever for catalyzing early or higher-risk innovations. Together, these six sources represent different types of capital and provide an understanding of the complementary role played by the private sector in financing climate mitigation and adaptation in the agri-food system.

4.1 Commercial Banking

When talking about commercial banking as a source of climate finance, we are referring to financial intermediaries that channel credit towards projects and initiatives aimed at adapting to and/or mitigating the effects of climate change. Among the instruments they can use for this purpose are green loans, *sustainability-linked loans* (SLLs), project finance and green *leasing*.

In the agri-food sector, this type of financing can be used, for example, for efficient irrigation and photovoltaic pumping projects, the development of biogas or biomethane biodigesters, the implementation of efficient refrigeration systems, or the acquisition of aquaculture machinery through green leasing, among other applications.

In climate finance channeled through commercial banks, the main risks of *greenwashing* stem from the application of green criteria that are not rigorous or not fully aligned with the European Union's taxonomy when granting loans. Added to this is the use of insufficiently ambitious climate indicators and targets, as well as limited traceability of the effective use of funds and the results achieved. Furthermore, there are still shortcomings in independent verification and in the quality of sustainability reports, which in many cases do not fully comply with European frameworks such as the Sustainable Finance Disclosure Regulation and the Corporate Sustainability Reporting Directive (ESMA, 2024).

4.2 Sustainable investment funds

Sustainable investment funds can be defined as investment vehicles managed by private sector entities that channel capital or debt into economic activities, companies, projects and initiatives that generate measurable benefits in terms of climate change mitigation and/or adaptation. These funds are structured considering environmental, social and governance criteria, as well as internationally recognized green taxonomies (BBVA, 2025a).

Among the main instruments they use are *venture capital, equity capital* and growth capital funds

These instruments make it possible to finance companies at different stages of development: from start-ups driving technological innovations with climate potential to established companies seeking to scale up sustainable solutions or transform their business models. In the agri-food sector, these funds are often allocated to initiatives with high transformative potential, such as the development of agricultural technology (*AgTech*), agrovoltaic energy projects and alternative proteins, among others.

However, this type of financing also presents risks of *greenwashing*, mainly due to the lack of consensus on what exactly constitutes a sustainable investment fund (Rial, 2025). According to the experts interviewed, these practices can occur when a fund declares a climate investment strategy without having solid metrics or evidence to support its results. The risk increases when investing in high-emission companies that lack a credible transition plan towards more sustainable models or when communicating environmental impacts that cannot be verifiably demonstrated.

4.3 Agricultural insurance

So far, two main strategies for climate risk management have been described. On the one hand, mitigation, which includes measures aimed at reducing the intensity or frequency of the phenomenon; and on the other, adaptation, which groups together actions aimed at reducing vulnerabilities and strengthening the resilience of systems. However, agricultural insurance incorporates a third approach to risk management: its transfer or derivation (Pérez Cimas, 2023).

In this sense, agricultural climate insurance is defined as a mechanism for transferring risk to third parties with the aim of protecting agricultural producers from economic losses caused by adverse climatic events, such as droughts, frosts, floods or excessive rainfall, among others. This instrument seeks to compensate for losses resulting from climate variability, thus ensuring greater economic stability for the sector in the face of the effects of climate change. At the same time, it provides producers with a safety net that facilitates the transformation and adoption of more sustainable agricultural practices (Ministry of Agriculture, Fisheries and Food [MAPA], 2025).

In Spain, the agricultural insurance system is configured as a highly complex and wide-ranging public-private hybrid model. Currently, this scheme offers 45 lines of insurance covering agricultural, livestock and aquaculture production (Pérez Cimas, 2023). The main types of cover include

(i) agricultural cover
frost, fire, flooding, rain, hail, drought, hurricane-force winds and other adverse weather conditions; and

(ii) livestock and aquaculture coverage
death or compulsory slaughter of animals, diseases or epizootics, compensation for the removal and destruction of dead animals, and lack of pasture for feeding livestock, among others.

Taken together, agricultural climate insurance is a key climate finance tool within the agri-food system, offering economic stability in the face of climate uncertainty and encouraging investment in more sustainable production practices.

4.4 Voluntary carbon markets

Carbon markets are trading systems designed to encourage GHG reduction by assigning an economic value to each ton of CO_2 equivalent (United Nations Development Program [UNDP], 2022). In addition to regulated markets, where emission rights are traded under emissions trading systems (ETS), there are voluntary carbon markets where governments, companies or individuals can buy and sell carbon credits. These credits are defined as certificates representing one ton of CO_2 equivalent avoided or absorbed, generated from projects that reduce emissions or capture carbon (Iberdrola, n.d.).

To issue credits, projects must be certified under recognized standards that guarantee their environmental integrity. Unlike regulated markets, voluntary market credits vary according to the type of project, its location and the social or environmental co-benefits it generates (Iberdrola, n.d.). It is therefore essential to carry out due diligence before purchasing them, assessing their quality, traceability and additionality.

In the agri-food sector, voluntary carbon markets have become increasingly important in financing sustainable initiatives linked to agriculture and land use. By enabling the sale of carbon credits, activities with climate benefits in the agricultural sector become more profitable, thus attracting private investment.

Ultimately, when properly designed, carbon markets can channel financial resources on a global scale towards nature-based solutions, contributing significantly to the sustainable transformation of agri-food systems. However, significant challenges remain, including the risk of *greenwashing*. The UNDP warns that some companies resort to purchasing carbon credits to project an environmentally responsible image without making real changes to their operations or production models. This risk is exacerbated by a lack of transparency, limited independent verification and the absence of robust and consistent standards to ensure the integrity, effectiveness and credibility of the credits issued (UNDP, 2025).

4.5 Green bonds

Green bonds are debt financial instruments created for the sole purpose of financing or refinancing projects that generate tangible environmental benefits (Iberdrola, 2025). To ensure their credibility, they must comply with the Green Bond Principles (GBP) established by the International Capital Market Association (ICMA). These principles are structured around four key components (ICMA, 2025):

(i) use of proceeds,
which defines the categories of eligible projects;

(ii) project evaluation and selection process,
which ensures environmental consistency and alignment with sustainable objectives;

(iii) fund management,
which guarantees traceability and transparency in the allocation of resources; and

(iv) reporting,
which establishes the obligation to periodically communicate the progress and impact of the projects financed.

The types of green bonds differ according to the categories of projects they finance. Among the most common are renewable energy, pollution prevention and control, sustainable management of natural resources and land use, biodiversity protection, clean transport, efficient water and wastewater management, the circular economy and sustainable buildings (BBVA, 2025b).

Green bonds have thus established themselves as one of the main tools for climate financing, enabling capital markets to mobilize private resources towards investments aligned with global sustainability goals.

4.6 Climate philanthropy

Climate philanthropy is defined as the contribution of private funds, generally from individuals, foundations and non-profit organizations, to support climate change adaptation and/or mitigation initiatives. Unlike other sources of climate finance, this type of capital is provided with no expectation of financial return or profit, as it usually takes the form of donations or grants, or yields significantly lower than the market.

One of its main strengths lies in its ability to take risks and act in areas where the traditional market does not reach, enabling the development of small-scale pilot projects with high transformative potential.

In the agri-food sector, climate philanthropy can play a key role in the transition to more sustainable and resilient models by facilitating innovations in areas such as regenerative agriculture, efficient water management, food waste reduction and ecosystem restoration.

However, only 2% of global philanthropic funds are currently allocated to climate change mitigation (World Economic Forum, 2024), highlighting a significant opportunity to expand philanthropic investment in this area and enhance its transformative impact on agri-food systems.

5. Redefining the climate finance architecture

This section presents a traffic light-style assessment of the climate finance architecture applicable to the agri-food system in the European Union and Spain. The aim is not to provide an exhaustive list, but rather to identify some of the elements that work well, those that require adjustments, and the structural failures that persist in relation to public and private instruments aimed at climate mitigation and adaptation throughout the agri-food chain. The analysis is based mainly on evidence obtained from interviews with experts in the sector, the results of a participatory validation workshop, and the technical experience of the team responsible for the report.

5.1 Structural weaknesses

Limited climate impact of the 2014–2020 CAP

According to the European Court of Auditors, during the 2014–2020 period, more than €100 billion from the Common Agricultural Policy was labelled as climate expenditure, but emissions from the agricultural sector barely decreased during this period. The report recommends that the European Commission strengthen the assessment and monitoring of the CAP's actual impact on climate change mitigation, so that its funds contribute more effectively to the sustainable transformation of agri-food systems.

Absence of specific 'green taxonomy' criteria for agriculture in the EU

Although the European Union's Sustainable Finance Taxonomy establishes criteria for multiple sectors, agricultural production is not yet formally included in EU Taxonomy legislation. This lack of official technical criteria makes it difficult for banks and investors to clearly identify which rural projects can be considered sustainable, although preliminary guidelines do exist.

Incentives that contradict climate objectives

Part of the CAP subsidies continue to be allocated to highly polluting activities.

Administrative and regulatory barriers

Administrative bottlenecks and slow permitting processes slow down key investments for agricultural adaptation and decarbonization. The sector complains of excessive bureaucracy and short windows for applying for aid.

Unequal access to credit

Access to finance remains one of the main challenges for the climate transition of the agri-food sector. Small farms and SMEs face greater difficulties in accessing credit, especially when it comes to sustainable investments or those with long-term return horizons. Young farmers are also limited by a lack of guarantees, credit history or sufficient assets, which restricts their ability to modernize their farms and incorporate green technologies. This financial gap slows down generational renewal and hinders climate innovation in rural areas.

5.2 Areas of progress and improvement

Eco-schemes maturing

The eco-schemes introduced in the 2023–2027 CAP represent a step towards more sustainable agricultural and livestock practices, but their scope remains limited.

LIFE program: strong growth, but access still complex

With more than €5.4 billion for 2021–2027, the LIFE program promotes high-impact climate projects. However, application procedures remain complex, making it difficult for small rural actors to participate. It is recommended that procedures be simplified and technical support for new applicants be strengthened.

Climate philanthropy on the rise

In recent years, a growing number of European foundations and philanthropic organizations have been redirecting part of their resources towards climate action for the transformation of agri-food systems, combining traditional grants with impact investment instruments. This trend seeks to enable philanthropic funds to act as catalysts for change, mobilizing private capital and demonstrating replicable models of sustainable financing.

Horizon Europe: innovation with little transfer to the field

The European Union's R&D framework program has increased the resources allocated to the agri-food sector, especially through Cluster 6. However, the transfer of results to farms and rural SMEs remains limited. In addition, some barriers to dissemination, demonstration and technology adoption remain, as does low participation by farmers and cooperatives in the definition and implementation of projects, despite the implementation of the multi-stakeholder approach.

5.3 Drivers of change

Spanish agricultural insurance system

According to experts, the Spanish agricultural insurance system is considered a benchmark in Europe due to its solid regulatory basis, close collaboration between the public and private sectors, and an effective financial support mechanism that maximizes the impact of public aid. This model has demonstrated a high capacity to respond to extreme weather events, providing economic stability to the agricultural sector and contributing to the resilience and sustainability of food production.

EIT Food as a catalyst for systemic change in the agri-food sector

Various experts highlight EIT Food's potential to effectively connect actors in the agri-food industry, the scientific community, civil society and public administrations, generating a dynamic of collaborative innovation that drives the transformation of the European agri-food system.

6. Conclusions

The transition to a more sustainable climate future necessarily involves the transformation of agri-food systems. Responsible for approximately one-third of global greenhouse gas emissions, their transformation has become a priority on the international political agenda. In this context, climate finance is a key tool for promoting adaptation and mitigation in the face of the effects of climate change. Rather than offering definitive answers, this report is intended as a starting point for collective reflection on how climate finance instruments can become drivers of change within agri-food systems.

With solid financial backing from both the public and private sectors, it is possible to promote innovations and practices aimed at decarbonizing agricultural production, adapting farms to water stress scenarios and protecting rural livelihoods. However, its scope must go beyond the productive sphere. Climate finance must act comprehensively across the entire agri-food value chain, covering processing, distribution, consumption, and waste management, as well as other related sectors.

However, this transformation will only be effective if financial flows are strategically reoriented to align economic incentives with climate objectives, as established in the Paris Agreement. This means prioritizing investments that reduce emissions throughout the value chain, encourage resource circularity, promote sustainable diets and minimize food waste. Consequently, the redesign of the financial architecture of climate finance should not be understood as a simple technical adjustment, but as a structural reform that is essential for agri-food systems to become true allies of global climate action.

The various instruments and sources of climate finance, including those with the potential to be geared towards this purpose, both in the European Union and in Spain, show significant progress in the transformation of agri-food systems. However, it is essential to maintain and expand these efforts.

Consolidating this transformation requires deepening multi-stakeholder dialogue and cooperation to redefine the architecture of climate finance and turn it into an effective lever for structural change in the agri-food system.

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Climate finance is emerging as a potential transformative driver of agri-food systems, as its scope spans all stages of the value chain, from production and processing to distribution, consumption, and waste management, as well as related sectors such as energy, water, and transport.

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