From research and practice to policy: Eco-Ready policy conclusions for an ecologically resilient European food system

Eco Ready

Foivos Anastasiadis[1], Annamaria Bevivino[2], Blandine Camus[3], Elodie Champseix[3], Luciana Di Gregorio[2], Sophie Galema[4], Arianna Latini[2], Jason Levin-Koopman[4], Nina Louvrou[5], Konstadinos Mattas[1], Annabel Oosterwijk[4], Saeed Moghayer[4], Gerhard Schiefer[6], Nam Vu[7]

[1]Aristotle University of Thessaloniki, [2]ENEA, [3]IUCN Europe, [4]Wageningen University & Research, [5]White Research SRL, [6]proQuantis, [7]Cranfield University

Funded by the European Union

The ECO-READY project has received funding from the European Union's Horizon Europe Research and Innovation Programme under grant agreement n° 101084201

Technical References

Project Acronym	ECO-READY
Project Title	Achieving Ecological Resilient Dynamism for the European food system through consumer - driven policies.
Project Coordinator	Czech University of Life Sciences (CZU)
Project Duration	48 months

Deliverable No.	D5.1
Dissemination level [1]	PU
Work Package	WP5
Task	Task 5.5
Lead beneficiary	IUCN Europe
Contributing beneficiary(ies)	Alternet CZU IFOAM EU
Due date of deliverable	30 November 2025
Actual submission date	28 November 2025

[1] PU = Public
PP = Restricted to other programme participants (including the Commission Services)
RE = Restricted to a group specified by the consortium (including the Commission Services)
CO = Confidential, only for members of the consortium (including the Commission Services)

Document history

V	Date	Beneficiary	Author
1	28/11/2025	Aristotle University of Thessaloniki, ENEA, IUCN Europe, Wageningen University & Research, White Research SRL, proQuantis, Cranfield University	Foivos Anastasiadis, Annamaria Bevivino, Blandine Camus, Elodie Champseix, Luciana Di Gregorio, Sophie Galema, Jason Levin-Koopman, Arianna Latini, Nina Louvrou, Konstadinos Mattas, Annabel Oosterwijk, Saeed Moghayer, Gerhard Schiefer, Nam Vu
2			

Funded by the European Union

The ECO-READY project has received funding from the European Union's Horizon Europe Research and Programme under grant agreement n° 101084201

Executive summary

This report presents ECO-READY’s consolidated interpretation of the project’s policy findings and initial conclusions. It explores the policy implications of the various research and practical outcomes across the project's Work Packages, contextualising them within European discussions on food system resilience.

The analysis concludes that climate change threatens all four pillars of food security, while biodiversity is a key factor in resilience. However, current EU policies remain fragmented, with weak integration between agricultural, climate and biodiversity legislation, and insufficient consideration of consumption-related policies. This is partly due to incomplete policy narratives and a lack of analysis of trade-offs. Enhancing food systems sustainability and Europe’s food security would require more support for sustainable agricultural practices, better data interoperability and use of agricultural data for policymaking and improved advisory services.

The policy conclusions set out in this deliverable will inform the project’s forthcoming policy recommendations with the aim of achieving ecological resilience in the European food system.

Funded by the European Union

The ECO-READY project has received funding from the European Union’s Horizon Europe Research and Programme under grant agreement n° 101084201

Disclaimer

This publication has been produced within the ECO-READY project which has been funded by the European Union Horizon Europe Research and Innovation Programme under grant agreement n°101084201.This publication reflects only the views of the author. The European Commission and Research Executive Agency cannot be held responsible for any use which may be made of the information contained therein.

Table of contents

Funded by the European Union

The ECO-READY project has received funding from the European Union's Horizon Europe Research and Programme under grant agreement n° 101084201

List of abbreviations and acronyms

AI	Artificial Intelligence
CAP	Common Agricultural Policy
CFP	Common Fisheries Policy
CGE	Computational General Equilibrium
CoP	Committee of Platform
EEA	European Environment Agency
EFSCM	European Food Security Crisis Preparedness and Response Mechanism
ESFA	European Food Safety Authority
FAO	Food and Agriculture Organisation
fsQCA	fuzzy-set Qualitative Comparative Analysis
GDP	Gross Domestic Product
GPP	Green Public Procurement
IoT	Internet of Things
IPCC	Intergovernmental Panel on Climate Change
JRC	Joint Research Centre
LCA	Life Cycle Assessment
LLM	Large Language Models
LLs	Living Labs
MSA	Mean-of-Species-Abundance
NRR	Nature Restoration Regulation
SDGs	Sustainable Development Goals
SHDB	Social Hotspot Database
SLR	Systematic Literature Review
SSPs	Shared Socioeconomic Pathways
WP	Work Package

Funded by the European Union

The ECO-READY project has received funding from the European Union's Horizon Europe Research and Programme under grant agreement n° 101084201

List of figures

List of tables

Funded by the European Union

The ECO-READY project has received funding from the European Union's Horizon Europe Research and Programme under grant agreement n° 101084201

Introduction

ECO-READY is a European research project aiming to achieve Ecological Resilient Dynamism for the European food system through consumer-driven policies, socio-ecological challenges, biodiversity, data-driven policy, and sustainable futures. The project recognises the profound impacts of climate change and biodiversity on food systems and consequently on food security at both regional and European levels.

To address these challenges, the project seeks to inform policymaking through insights from scientific research and practical experience, drawing particularly on a network of ten Living Labs across Europe. Over the past three years, partners have produced a wide range of research outputs, practical findings, and scenario-building exercises across various Work Packages of the project. Each of these outputs contains policy-relevant insights that contribute to the policy recommendations formulation process. The objective of this deliverable is to provide a first integrated interpretation of these findings.

Deliverable 5.1 therefore presents ECO-READY’s first consolidated policy conclusions, synthesising the knowledge produced during the initial phases of the project. Positioned at the intersection of food security, climate change, and biodiversity, this deliverable aims to translate the project’s evidenced-based findings into preliminary policy-relevant conclusions that can guide the forthcoming phases of ECO-READY and support the EU’s broader ambition to build more resilient and sustainable food systems. To this end, the deliverable draws on outputs produced within Work Package 5 and all other Work Packages, including the structured data review, the analysis of EU policy frameworks, results of the MAGNET model, stakeholder and consumer analysis, and the Living Labs’ scenario-building exercises, among others.

By bringing together these diverse forms of evidence, Deliverable 5.1 identifies cross-cutting patterns and develops policy conclusions that will drive the formulation of ECO-READY’s policy recommendations in subsequent stages of the project. In this respect, the deliverable does not seek to present final recommendations; rather, it lays the conceptual and analytical foundations upon which they will be developed. The conclusions presented here serve as a reference point for future iterations of the project’s policy process. As such, D5.1 occupies a central position in the project’s trajectory: it marks the transition from fragmented policy findings to an integrated interpretative phase, enabling the identification of common conclusions and preparing the ground for evidence-based recommendations later in the project.

The document is structured as follows. It first situates ECO-READY’s work within the evolving European policy landscape on food system resilience. It then outlines the project’s multidisciplinary and multi-stakeholder approach, emphasising how the integration of diverse evidence and engagement processes contributes to the robustness of policy insights. Section 3 consolidates findings from the project’s key analytical components, presenting the policy outcomes derived from previous research and practice activities. Finally, the deliverable provides a thematic analysis of these outcomes, articulates a series of convergent policy conclusions, and outlines the next steps for transforming these conclusions into actionable policy recommendations.

ECO-READY Deliverable 5.1 was created thanks to the participation of the ECO-READY Living Labs AIDEMEC, CONCAT, EcoReadyMasuria, EcoVita, ESAPPIN, LivOrganic, LOFS, Probio, SECO Collab and THALLA, whose contributions were facilitated by Despina Kampouridou

Funded by the European Union

The ECO-READY project has received funding from the European Union’s Horizon Europe Research and Programme under grant agreement n° 101084201

(Reframe Food). We also thank the following individuals and organisations for their valuable contributions and thorough proofreading: Nils Bunnefeld (Alternet), Konstadinos Mattas and Foivos Anastasiadis (Aristotle University of Thessaloniki), Nam Vu and Michael Bourlakis (Cranfield University), Jana Poláková (Czech University of Life Sciences), Luciana Di Gregorio, Annamaria Bevivino and Arianna Latini (ENEA), Boglarka Bozsogi (IFOAM EU), Blandine Camus and Elodie Champseix (IUCN), Gerhard Schiefer (proQuantis), Saeed Moghayer, Jason Levin-Koopman, Sophie Galema and Annabel Oosterwijk (Wageningen University & Research), and Nina Louvrou (White Research SRL).

1 Contextualising Food Systems Resilience within the European Policy Landscape

This chapter provides an overview of the current challenges associated with food security in Europe, outlines the state of play regarding recent related policy initiatives, and situates ECO-READY's systemic approach within this context.

1.1 Food Systems Resilience as a European Policy Challenge

Food security, as defined by the Food and Agriculture Organisation (FAO) as "the assurance that all people, at all times, have physical and economic access to sufficient, safe and nutritious food that meets their dietary needs and food preferences for an active and healthy life", constitutes a major global challenge highlighting the intrinsic interdependencies between food production and its environmental context, and, more broadly, between agriculture, biodiversity, and climate.

In Europe, agricultural production is increasingly constrained by climate change, particularly as a result of rising temperatures and the growing frequency of extreme weather events. Water-related hazards such as droughts and floods exert especially severe impacts on crop yields. The European Environment Agency (EEA) for example reports that the exceptional drought that affected much of Europe in 2022 led to maize yield losses of up to 60% (EEA, 2025).

Biodiversity loss further undermines agricultural production, notably through the decline of soil biodiversity and of pollinator populations and their associated ecosystem services. It is estimated that approximately 12% of agricultural production in Europe is at risk due to pollinator decline (EEA, 2025). At the same time, evidence demonstrates that restoring agricultural ecosystems has positive effects on long-term food productivity and food security (IPCC, 2019), which prompted the EU to set targets through the Nature Restoration Regulation.

The Joint Research Centre (JRC) has identified natural and climate-related hazards as the principal threats to food security. Grouped under biophysical and environmental risks, encompassing climate change, extreme events, soil degradation and biodiversity loss, these threats are perceived by food system stakeholders as exerting the strongest influence on food security, ahead of economic and market risks, socio-cultural and demographic risks, or geopolitical and institutional risks (Bertolozzi-Caredio et al., 2023).

At the same time, food production systems and agricultural practices themselves contribute significantly to biodiversity loss and climate change. Food consumption alone accounts for nearly one-third of natural resources use in Europe, while food systems more broadly represent one of the main drivers of ecosystem degradation (EEA, 2025). These dynamics directly threaten agricultural production capacity, affecting yields and, ultimately, the availability of food for European consumers.

Funded by the European Union

The ECO-READY project has received funding from the European Union's Horizon Europe Research and Programme under grant agreement n° 101084201

The interdependence of agriculture, biodiversity, and climate is therefore of critical importance for food security. Considering the four pillars of food security, availability, access, utilisation, and stability, climate change poses the greatest risks to accessibility, and to a lesser extent to availability. The increasing frequency and intensity of climate-related shocks has a well-documented impact on yields (Jensen & Hourdin, 2025). Yet, while effects on overall availability are also anticipated, climate change is more likely to drive price volatility and market instability than outright shortages as underlined by the European Commission (2023).

Consequently, current risks to food security in Europe primarily concern economic access to food, while climate change and biodiversity loss place mounting pressure on agricultural production. At present, approximately 6.8% of the European population experience moderate to severe food insecurity (FAO et al., 2025). Despite overall abundance, access to nutritious food remains unequal, with low-income populations particularly vulnerable. These groups are thus most exposed to the deteriorating food accessibility resulting from biodiversity and climate crises, which are expected to intensify in the future (EEA, 2025).

In this context, it is essential to assess the future trajectory of food security in Europe to understand its resilience to growing challenges. Responding to these concerns, the European Union adopted the Farm to Fork Strategy in 2020 as part of the European Green Deal. With the overarching objective of promoting a fair, healthy and environmentally sustainable food system, the strategy explicitly seeks to safeguard food security in the face of threats linked to climate change and biodiversity loss.

In anticipation of more severe crises, the Farm to Fork Strategy prompted, in 2021, the establishment of the EU Contingency Plan for Ensuring Food Supply and Food Security in Times of Crisis. This plan acknowledges both the likelihood that climate and biodiversity related risks will have more severe impacts on EU food security than the COVID-19 pandemic, and the necessity of a systemic food systems approach to strengthen crisis management capacity. Operationally, this plan led to the creation of the European Food Security Crisis Preparedness and Response Mechanism (EFSCM), mandated both to anticipate and to prevent food crises and to manage them when they occur. Established in 2022, the EFSCM institutionalises a multi-actor governance mechanism, bringing together representatives from Member States, the European Commission, food value chain actors, and food security experts. Since its inception, the EFSCM has adopted a set of recommendations on crisis communication, diversification of supply sources, and risk reduction in food supply chains, thereby enhancing EU preparedness. It has also overseen the development of the Food Supply and Security Dashboard, a key objective of the contingency plan.

Since the launch of ECO-READY, food security has remained central to EU agricultural and political agendas. The Vision for Agriculture and Food, presented by the European Commission in February 2025, acknowledges the challenges facing the European agri-food sector and highlights the need for a policy response centred on resilience, competitiveness and sustainability. It also stresses the importance of strengthening preparedness along the entire food value chain. In line with this ambition, Commissioner Hansen emphasised the further consolidation of the EFSCM’s role. In March 2025, the EU preparedness strategy underlined the necessity of conducting regular stress tests, and since spring 2025, the EFSCM has been working on developing annual exercises to evaluate and reinforce the robustness of EU food security.

Funded by the European Union

The ECO-READY project has received funding from the European Union’s Horizon Europe Research and Programme under grant agreement n° 101084201

Food system resilience has thus emerged as a major policy challenge for the European Union. This priority is structured, on the one hand, around a coherent set of initiatives and objectives centred on food security, and on the other, embedded within a broader policy framework shaped by the European Green Deal and by the flagship policies of the EU programming periods. This framework integrates food security concerns across agricultural policy, soil management, biodiversity restoration, and climate mitigation and adaptation strategies. It reflects the EU's commitment to addressing food security not as an isolated issue, but as an integral component of a wider constellation of interdependent public policies designed to strengthen long-term sustainability and resilience.

1.2 ECO-READY's contribution to Achieving Ecological Resilient Dynamism for the European Food System

In the current context of heightened vulnerability in food security, and its growing prominence on the European Union's political agenda, ECO-READY positions itself as a strategic initiative designed to generate knowledge and tools that enhance the resilience of food systems. In alignment with recent EU initiatives, such as the Farm to Fork Strategy and the European Food Security Crisis Preparedness and Response Mechanism (EFSCM), the project complements existing mechanisms by providing a robust scientific evidence base and innovative operational instruments, while simultaneously incorporating the consumer dimension.

To achieve this ambition, ECO-READY advances an in-depth understanding of risks to food security, in relation to climate change and biodiversity. This effort is grounded in comprehensive data collection and analysis, scenario development and modelling, and the direct engagement of stakeholders through its network of ten Living Labs. Each of the Living Lab focuses on five flagship products that reflect the agricultural production systems and dietary habits of its territory. Collectively, this generates a portfolio of 36 staple food products across Europe, covering the principal food groups: cereals, dairy, fruits, leafy vegetables, legumes, meat and fodder, oils, and fish (Dettenhofer, Agyenim-Boateng, & Kandel, 2024). This selection provides strong representativeness of Europe's key agricultural and food products and enables ECO-READY to conduct relevant risk analyses and scenario assessments at continental scale. The study of trends and risks associated with these products, combined with modelling through MAGNET and Life Cycle Assessment (LCA), supports forward-looking evaluations of the impacts of diverse threats, whether environmental, climatic, socio-economic or institutional. Beyond the identification of risks, the project also highlights their potential implications, in line with broader European trends that emphasise the correlation between climate change, agricultural yields and food accessibility.

In response to these risks, and in line with the EU Contingency Plan for Ensuring Food Supply and Food Security in Times of Crisis, ECO-READY contributes to the development of contingency strategies aimed at strengthening the resilience of food systems. The project clarifies the steps required for the design and operationalisation of such plans, embedding adapted risk-analysis methodologies. Moreover, through its Living Lab network, ECO-READY builds the bridge to the regional level, reinforcing local capacities for the territorial design and implementation of contingency planning.

Funded by the European Union

The ECO-READY project has received funding from the European Union's Horizon Europe Research and Programme under grant agreement n° 101084201

Moreover, echoing the EU Food Security Dashboard, the ECO-READY Observatory is a key governance instrument for European food systems. Conceived as an interactive digital platform, it will centralise data from the Living Labs and other sources, alongside research findings and policy recommendations. The Observatory offers dynamic dashboards and visualisation tools for analysing food security across territories and product categories. Accessible through both an online interface and a mobile application, it will function as a multi-level decision-support instrument: for policymakers, a strategic tool for risk monitoring and tailored policy design; for practitioners, including farmers, a source of operational information; and for citizens, a channel for awareness-raising and guidance towards more sustainable consumption practices. Importantly, the Observatory will also act as an early-warning system, capable of detecting weak signals of crisis and enabling rapid, coordinated responses.

Finally, recognising the need underscored by European institutions for greater articulation between policy frameworks, ECO-READY undertakes analyses of synergies and gaps across policies related to food systems. The objective is to translate accumulated knowledge into robust, scientifically grounded and actionable policy recommendations, directly supporting the objectives of the European Green Deal’s Farm to Fork Strategy. ECO-READY’s contribution is designed to be durable as its recommendations are intended not only to inform current policies and mechanisms, but also to shape European debates on the agriculture–biodiversity–climate nexus in the 2028–2034 programming period.

Thus, in a European landscape where food security constitutes a social, economic, and ecological challenge, ECO-READY is uniquely positioned to provide a coherent and complementary response to EU initiatives, contributing to more a resilient food system in the context of the established relationship between food systems, climate change and biodiversity.

Funded by the European Union

The ECO-READY project has received funding from the European Union’s Horizon Europe Research and Programme under grant agreement n° 101084201

2 Approach to Interdisciplinary and Multistakeholder Engagement in Policy Recommendations Development

This chapter outlines ECO-READY's overarching approach to fostering a transdisciplinary and multi-stakeholder approach to food security. It demonstrates how this approach supports a systemic understanding of the issue and underpins a more robust and evidence-informed process for developing policy recommendations.

2.1 Integration of Interdisciplinary Evidence

Addressing the food security challenge in Europe, ECO-READY embraces a systems approach to food issues. Food systems extend far beyond agriculture; they are complex systems comprising multiple interrelated components. These include farming practices, environmental and climatic conditions, associated dietary behaviours and regulatory frameworks governing production. In this context, a systemic approach recognises the interconnections among the elements of agri-food systems and their dependent subsystems. Such an approach considers linkages across the entire chain, from production to consumption, while balancing economic, environmental, social and health objectives (FAO, 2025).

Thus, a comprehensive understanding of food systems requires contributions from a variety of disciplines, ensuring that this multifaceted challenge is explored from complementary angles. Furthermore, the interactions between agricultural production and environmental sustainability are particularly intricate, demanding a granular understanding of the trade-offs at stake. This is crucial for designing solutions that support the transition to more resilient and sustainable food systems. The close relationship between food security and sustainability consequently necessitates an extensive, multidisciplinary evaluation (Di Gregorio et al., 2024a).

ECO-READY builds on a broad range of disciplines to enhance the resilience and sustainability of Europe's food systems. Figure 1 illustrates the diversity of scientific fields, according to the latest update of the OECD field of science and technology classification, that are mobilised by ECO-READY and whose findings will inform policy recommendations. Here, agricultural sciences underpin analyses of farming, fisheries, and soil management practices, while natural sciences, including earth, environmental, and biological sciences, support assessments of how climate change and biodiversity loss affect production systems. Finally, an array of social sciences, including economics, psychology, and political science, to examine the socio-economic impacts of agricultural practices and food choices, understand consumer behaviour and sustainable consumption and analyse the institutional levers and constraints that could support more resilient food systems.

Funded by the European Union

The ECO-READY project has received funding from the European Union's Horizon Europe Research and Programme under grant agreement n° 101084201

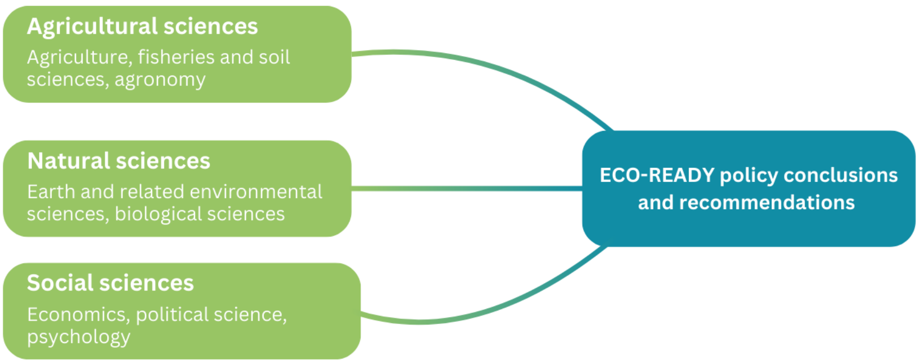


Figure 1: Representation of scientific fields and disciplines contributing to ECO-READY's interdisciplinary approach

By integrating these diverse perspectives, ECO-READY addresses food security as a multidimensional challenge, acknowledging the interconnectedness of environmental, climatic, economic, social, and institutional factors. Engaging with agricultural, natural, and social sciences simultaneously enables the project to adopt a systemic approach that is essential for developing balanced, science-based solutions that are tailored to local contexts. This diversity also mitigates the risk of blind spots and enhances the credibility of the evidence underpinning policy outputs.

This approach is also reflected in the diversity of the Work Packages (WP) that contribute to the formulation of policy conclusions and recommendations. Our process intends to integrate results from research activities that use multiple methodologies from across the project's disciplines (e.g., literature review (WP1), MAGNET modelling (WP1) scenarios development (WP1), Delphi study applied to consumers' perceptions (WP2), Living Labs' engagement (WP3), Horizon Scanning and Foresight Methods (WP5)) to triangulate findings to actionable policy outputs. Figure 2 provides an overview of ECO-READY's Work Packages and illustrates how each contributes to or benefits from the formulation of policy recommendations. This structure demonstrates how the project's interdisciplinary and systemic approach ensures that insights generated in diverse scientific fields are synthesised into robust, evidence-based recommendations for European food policies.

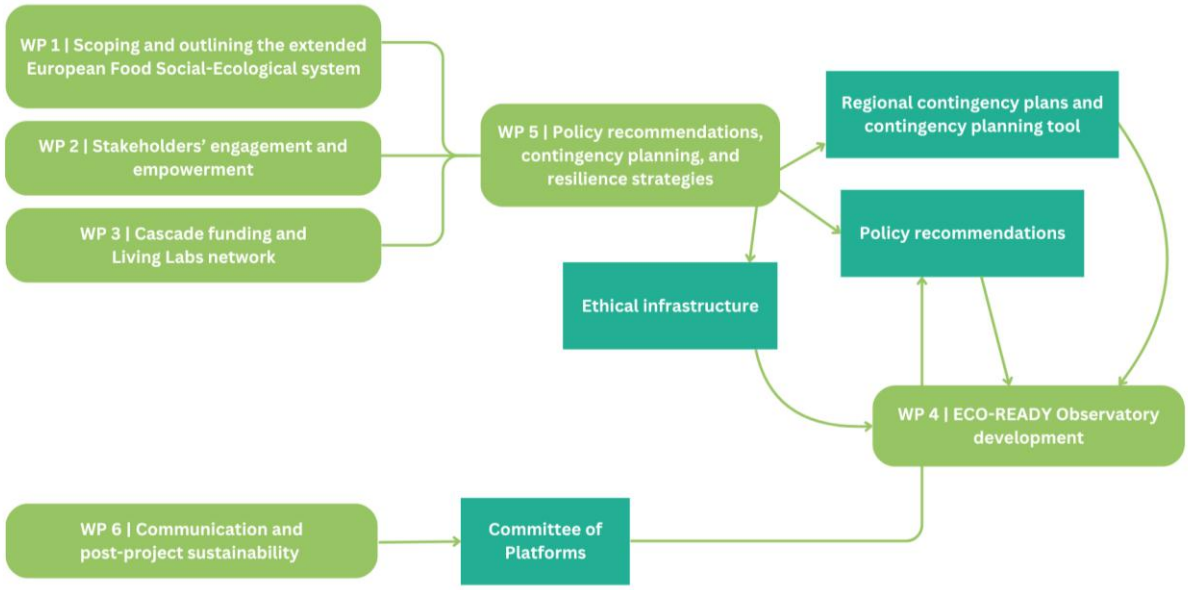


Figure 2: Overview of ECO-READY Work Packages' contribution and connections to policy recommendations

ECO-READY does not simply juxtapose research results from different disciplines. The project integrates expertise through shared tools and processes. Thus, insights from

Funded by the European Union

The ECO-READY project has received funding from the European Union's Horizon Europe Research and Programme under grant agreement n° 101084201

agricultural and social sciences guide the development of the Observatory, while climate projections inform agricultural and economic modelling for instance. This integrated approach generates new knowledge and innovative policy findings that could not emerge from a single disciplinary perspective alone.

Overall, ECO-READY promotes a genuinely interdisciplinary research approach, enabling a comprehensive understanding of the many facets of complex food systems. This approach supports the formulation of policy conclusions and recommendations validated across multiple scientific fields, thereby strengthening their robustness and increasing the likelihood of successfully guiding the transformation of European food systems towards greater resilience and sustainability.

2.2 Stakeholder Involvement in Policy Recommendations Development

The complexity of food systems is mirrored in the heterogeneity of socio-economic actors involved in their functioning. Transforming such systems thus requires the active participation and coordinated collaboration of all relevant stakeholders. Multi-actor cooperation is therefore a critical enabling condition for overcoming fragmented, siloed approaches and for advancing towards a genuine systems approach, which is indispensable to the transformation of food systems (FAO, 2025). ECO-READY plays a central role in this regard, as it mobilises a plurality of actors from researchers to practitioners (e.g., farmers, processors, retailers), consumers, and policymakers. Their joint engagement ensures the adoption of the holistic perspective required to address the multifaceted challenges of food systems.

The scientific community constitutes a fundamental pillar of this research and innovation endeavour. Researchers are involved across all Work Packages, representing a broad range of disciplines and methodological approaches. Their contribution anchors the project in a rigorous interdisciplinary framework, which is indispensable for capturing the multiple and interdependent dimensions of food systems. Scientific involvement has been demonstrated in the project for example by organising focus groups on scenarios and drivers with researchers across scientific domains (covered in detail in Polakova et al. 2025).

Beyond academia, ECO-READY also mobilises a wide range of practitioners through a network of ten Living Labs (LLs), selected from thirty-eight applications submitted to an open call. These Living Labs were chosen for their demonstrated excellence in the domains of food security, biodiversity, and climate change, for their capacity to generate impact across the food value chain (farmers, processors, retailers, consumers), and for their potential to contribute to the resilience of food systems (Fotakidis et al., 2024).

The ten selected Living Labs ensure balanced geographical representation across four major European bioclimatic regions:

- Mediterranean and South-West Europe - three Living Labs: AIDEMEC (Italy), CONCAT (Spain), THALLA (Greece).
- Central and Eastern Europe - three Living Labs: EcoReadyMasuria (Poland), Probio (Czech Republic), EcoVita (Hungary).
- North-West Europe - two Living Labs: ESAPPIN (Germany), LOFS (France).
- Scandinavian and Baltic region - two Living Labs: SECO Collab (Sweden), LivOrganic (Denmark).

Funded by the European Union

The ECO-READY project has received funding from the European Union’s Horizon Europe Research and Programme under grant agreement n° 101084201

In addition to this territorial distribution, the network reflects a diversity of production systems (conventional, organic, and vertical farming), thereby capturing the heterogeneity of European agriculture. This diversity is captured in Figure 3.

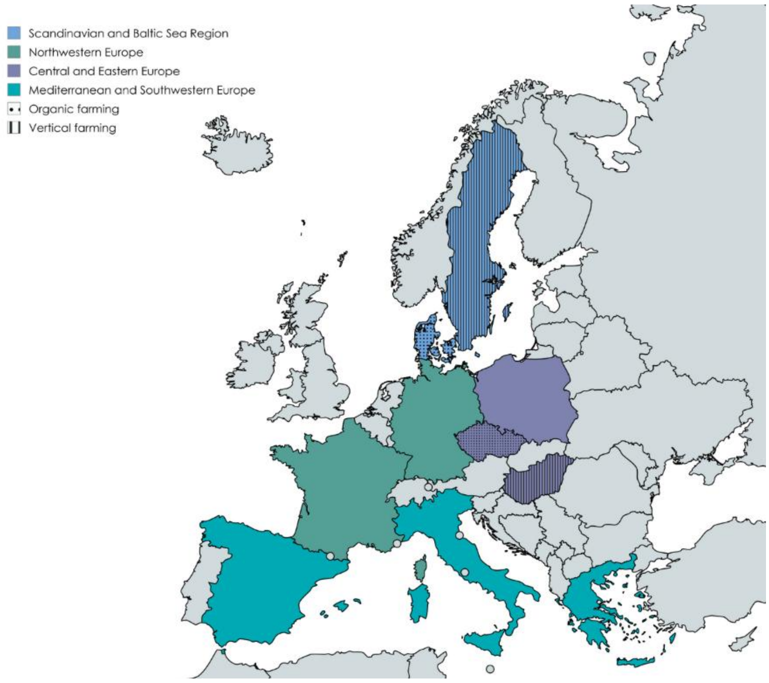


Figure 3: Overview of ECO-READY Living Labs' territorial and production system distribution

The work carried out with the Living Labs transcends interdisciplinarity and is embedded in a transdisciplinary approach, integrating civil society directly into the co-construction of solutions and recommendations. This approach enhances the practical relevance of project outputs by involving stakeholders responsible for implementation in the design process itself. By increasing both ownership and practicality, this also improves the uptake potential and accelerates the transition towards more resilient food systems.

From the outset, ECO-READY has also integrated consumers into its reflection process. This occurs, first, through their participation in Living Labs, some of which include representative organisations such as the Union of Working Consumers of Greece and the Association of Conscious Consumers. Second, researchers engage directly with consumers to investigate their perceptions, attitudes, and awareness regarding the challenges of climate change, biodiversity loss, and food security. These interactions provide crucial insights into consumer needs, interests, and behavioural drivers, thereby informing strategies to promote more sustainable consumption. By aligning perspectives across production, processing, and consumption, ECO-READY fosters a coherent integration of new practices in the domains of food security, climate change, and biodiversity.

Furthermore, the contribution of policymakers and policy experts is institutionalised through the Committee of Platforms (CoP), complemented by recurrent consultation with leading European policy experts in workshops and conferences. Their involvement is critical both to delineate the scope of the issues under consideration and to contextualise project outputs within the existing legal and policy frameworks governing European food systems. This ensures that recommendations are not only scientifically sound but also genuinely actionable.

The multi-stakeholders approach anchors project activities in a broad spectrum of perspectives, methodologies, and sources, thereby strengthening the evidence base for

Funded by the European Union

The ECO-READY project has received funding from the European Union's Horizon Europe Research and Programme under grant agreement n° 101084201

policy recommendations. Because these perspectives are derived from diverse scientific disciplines as well as from practice-based knowledge, the conclusions reached are more robust, innovative, and policy-relevant than those emerging from homogeneous groups of stakeholders. This pluralism increases the credibility of project outcomes in both the scientific and policy arenas, thus enhancing their potential to contribute meaningfully to the resilience of the European food system. Importantly, multi-actor engagement is organised as an iterative process, allowing perspectives to be confronted, reassessed, and refined as the project progresses. This dynamic further supports the dismantling of siloed approaches and fosters genuine dialogue between all food system stakeholders.

Given that food systems are inherently heterogeneous and shaped by multiple interests and values, inclusive engagement is indispensable for reconciling divergent viewpoints (OECD, 2021). All in all, the iterative multi-stakeholder engagement approach of ECO-READY enables the formulation of policy conclusions that are both scientifically robust and socially legitimate.

Funded by the European Union

The ECO-READY project has received funding from the European Union’s Horizon Europe Research and Programme under grant agreement n° 101084201

3 Consolidation of Initial ECO-READY Policy Findings

This chapter presents the policy-relevant findings generated across the various ECO-READY Work Packages. Each section provides a concise overview of the objectives and methodological approaches adopted, and highlights the specific insights that contribute to the identification of policy conclusions. In doing so, the chapter demonstrates the collective contribution of the WPs to the formulation of coherent and evidence-based policy conclusions and recommendations. In the subsequent chapter, these findings will be placed in relation to one another to identify convergent policy conclusions.

3.1 Insights from the Literature Review

A Systematic Literature Review (SLR) was conducted with the aim to synthesise current scientific knowledge regarding climate change and biodiversity as the drivers of food security. Driver refers to any natural or anthropogenic factor that forces change to an ecosystem, either directly or indirectly. To this end, Deliverable 1.1 "Climate change, biodiversity, and food security nexus: A structured data review", identifies the set of factors influencing food security induced by climate change and biodiversity and analyses the impacts of these factors on the four key pillars of food security (availability, accessibility, utilisation, and stability) (Vu & Bourlakis, 2024). Furthermore, a holistic search, using five sources (academic literature, national projects, European projects, EUSTATS, and an internet search), was utilised to locate data that reports and/or monitors the previously determined drivers. The purpose of this activity is to assess the current state of available data monitoring critical drivers of food security, with an emphasis on climate change and biodiversity-induced drivers.

The primary method used is Systematic Literature Review. This method of reviewing literature aims to create a scientific, robust, and replicable process for selecting and synthesising relevant studies to the objective. 342 academic papers were reviewed, and from the selected studies, 20 climate change drivers and 18 biodiversity drivers with clear impacts on food security were identified. Evidence of impacts was found on all food security pillars; however, most impacts are on the availability and accessibility of food. Additionally, 27 data sets were determined as the results of academic research, 27 projects (at national and European levels) with relevant data, 28 public data platforms, and 5 EUROSTAT data sets which are for monitoring the drivers as identified from the literature.

Figure 4 and figure 5 provide a brief overview of the key findings regarding the drivers of food security stemming from climate change and biodiversity. In sum, those drivers can affect food security by altering the habitats, behaviours, phenology, physiology, yields, and resilience of species vital for food supply. Habitat refers to the environment in which crops or animals grow. Phenology describes the biological events and changes during the life cycle of plants and animals (e.g., birth, maturity, reproduction, and so on). Physiology involves the functions and activities of organisms. Resilience, in this context, refers to how a certain species can withstand and/or recover from adverse conditions and climatic events. Furthermore, food security is examined through four facets: availability, accessibility, utilisation, and stability.

Funded by the European Union

The ECO-READY project has received funding from the European Union's Horizon Europe Research and Programme under grant agreement n° 101084201

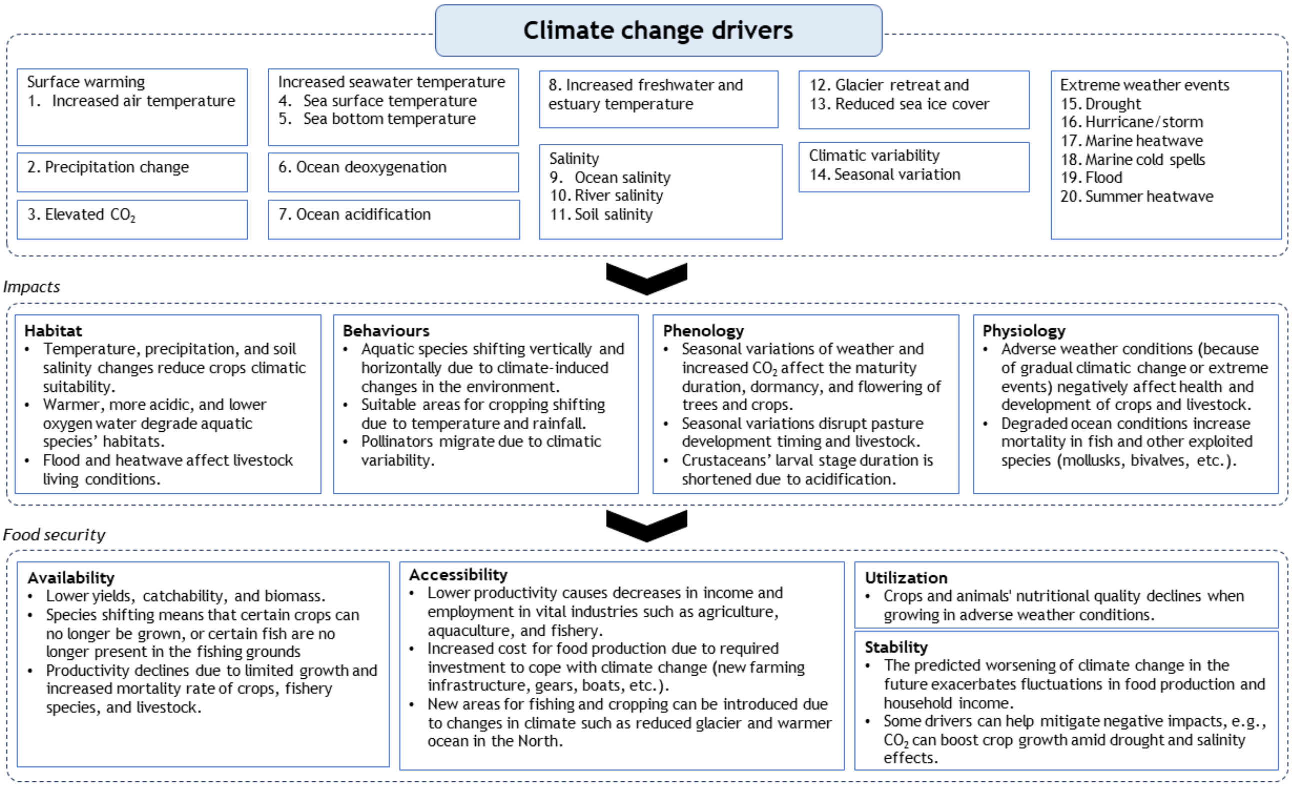


Figure 4: Overview of the climate change drivers of food security

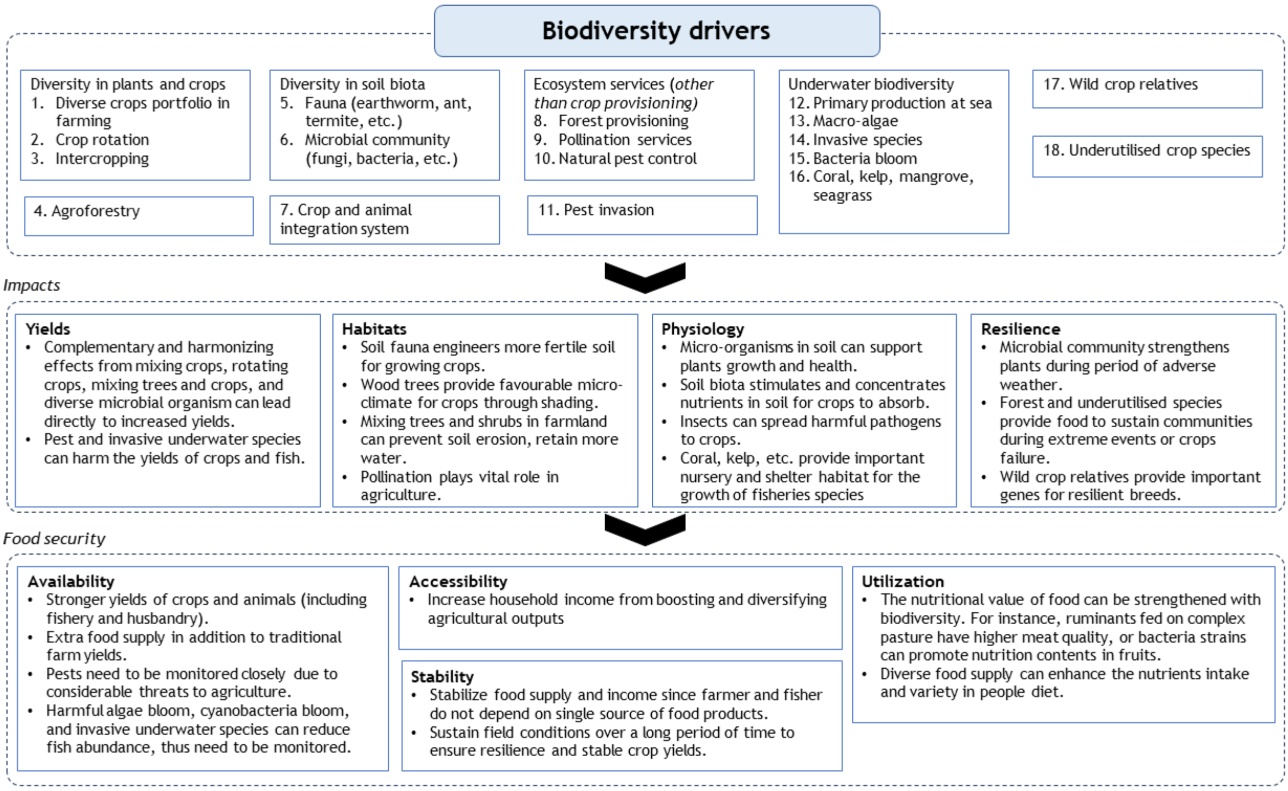


Figure 5: Overview of the biodiversity drivers of food security

These findings have different implications for food security. First and foremost, it is concluded that climate change and biodiversity are critical drivers which can affect multiple facets of food security. It is found that climate change and biodiversity drivers have strong implications for food availability and accessibility, while utilisation and

Funded by the European Union

The ECO-READY project has received funding from the European Union's Horizon Europe Research and Programme under grant agreement n° 101084201

stability pillars of food security experience moderate effects from the identified drivers. For climate change drivers, most impacts are negative, with scarce instances of surprising positive impact on food security from climate change. Thus, these findings advocate for continuous efforts in addressing climate change and preparing the food system to better manage/mitigate the adverse effects of climate change. For biodiversity drivers, the findings indicate numerous benefits from utilising biodiversity for strengthening food production and food security. Therefore, these findings support further integration of practices and solutions that promote biodiversity in the food system.

Furthermore, these findings provide implications to policy. The literature regarding the impacts of climate change and biodiversity on food security is rich and in-depth, demonstrating that climate change and biodiversity drivers are critical to food security. Therefore, future policies should consider these two determinants thoroughly during development. Policies must not only recognise the effects of climate change and biodiversity on food security, but they should also take into account how the food system contributes to climate change and the current state of biodiversity to prevent adverse consequences in the long-term. Furthermore, this work examined climate change and biodiversity as drivers of food security at a global scale, therefore, it is essential to carefully consider the regional context when evaluating the drivers of food security. Each specific region of Europe has their own core food products, unique climate, and particular biodiversity state. Thus, it is necessary for policymakers to specify the most critical drivers of their regions to improve the reach and impact of their policies. Finally, for both industry and policies, these findings advocate for a stronger use of data in decision-making, especially when accounting for climate change and biodiversity drivers.

3.2 Policy Evidence from the Systematic Review of Policies

A systematic review of policies examined how EU policies address the interconnected challenges of food security, biodiversity, and climate change under WP1 Scoping and outlining the extended European Food Social-Ecological system (Di Gregorio et al., 2024a). The task pursued three main objectives:

1. Mapping and analysing EU policies to assess the extent to which food security, biodiversity, and climate change dimensions are integrated across relevant legislative and strategic frameworks.
2. Assessing the science-policy interface, in other words, whether and how scientific evidence and data are embedded in legislative frameworks.
3. Identifying policy gaps and opportunities, with a focus on their implications for building resilient, sustainable, and equitable European food systems.

Beyond mapping, the exercise aimed to create a dialogue with policy actors through dedicated consultations, thereby grounding the analysis in both scientific evidence and stakeholder perspectives.

To this end, the methodology combined knowledge synthesis tools with stakeholder engagement. The two following knowledge synthesis methods were used:

- Expert consultation: Interviews, group meetings, and consultations with EU institutions (e.g., JRC), NGOs (e.g., IUCN, WWF), farmers' organisations (e.g., Confagricoltura, Copa-Cogeca), and food industry representatives. This Scoping

Funded by the European Union

The ECO-READY project has received funding from the European Union's Horizon Europe Research and Programme under grant agreement n° 101084201

Group provided feedback on the policy analysis and highlighted practical concerns (e.g., costs for smallholders, market competition).

- The systematic review exercise, which demonstrated the following key findings:
  - Integration of sustainability into agri-food policy: The European Green Deal, Farm to Fork strategy, and the Common Agriculture Policy's (CAP) "green architecture" contain climate and biodiversity objectives. Eco-schemes incentivise sustainable farming practices, while strategies address resilience and circularity.
  - Emergence of systemic resilience: Policy documents increasingly adopt a resilience framing, linking food security, biodiversity, and climate change to systemic risks (pandemics, conflicts, extreme climate events).
  - Acknowledgement of multidimensional food security: Policies reflect the four pillars of food security (availability, access, utilisation, stability), at least in principle, and align with the Sustainable Development Goals (SDGs).

The systematic review also revealed a number of policy gaps that are crucial to address in order to enhance the resilience and sustainability of food systems:

- Fragmented data-policy integration: Despite the availability of extensive datasets (e.g., from JRC, EEA, European Food Safety Authority (EFSA)), policies lack real-time monitoring tools and effective integration of scientific evidence into decision-making.
- Peripheral attention to access and equity: Bibliometric networks place "food access" at the margins, highlighting a weak integration of social justice and affordability concerns into environmental and agricultural frameworks.
- Smallholder vulnerability: CAP eco-schemes, while environmentally positive, impose disproportionate costs on small-scale farmers, reducing competitiveness against imports.
- Marginalisation of innovation areas: Critical topics such as soil health indicators, One Health, ecosystem degradation, precision farming, microbial solutions, and new genomic techniques remain underrepresented in current legislation, despite their importance for FS, BD, and CC goals.
- Biodiversity implementation gaps: Although EU strategies acknowledge the importance of pollinators and ecosystem services, there is a persistent lack of enforceable mechanisms and measurable indicators to ensure meaningful implementation and progress tracking.

Drawing on the findings from the systematic review and its associated publication *Getting (ECO)Ready: Does EU legislation integrate up-to-date scientific data for food security and biodiversity preservation under climate change?* (Di Gregorio et al., 2024b), a series of policy recommendations have been developed:

1. Strengthen science-policy integration: Establish structured mechanisms to embed real-time, interoperable datasets (e.g., Copernicus, farm-level monitoring systems) into policy dashboards for CAP and Green Deal evaluation.
2. Adopt landscape-specific approaches: Recognise territorial differences by tailoring biodiversity and climate policies to local socio-ecological contexts, enabling adaptive management and avoiding "one-size-fits-all" solutions.

Funded by the European Union

The ECO-READY project has received funding from the European Union's Horizon Europe Research and Programme under grant agreement n° 101084201

3. Support smallholders and equity: Adjust CAP eco-schemes to reduce burdens on small farms, ensuring that environmental objectives do not exacerbate inequalities in food access.
4. Operationalise biodiversity targets: Incorporate measurable indicators (e.g., pollinator abundance, soil biodiversity, ecosystem functions) into CAP and Biodiversity Strategy monitoring.
5. Promote technological and bio-based innovation: Integrate emerging technologies such as internet of things (IoT), artificial intelligence (AI), microbiome analysis, gene editing, and precision farming into policy frameworks to enhance both sustainability and productivity.
6. Mainstream One Health: Explicitly embed One Health principles across food security, biodiversity, and climate change policies, linking food system sustainability with human, animal, and environmental health.
7. Enhance governance and participation: Engage stakeholders across the entire food chain, including farmers, processors, and consumers, in policy design, building trust and ensuring relevance.

In addition, the evidence underscores that food security cannot be achieved without simultaneously addressing biodiversity and climate resilience. Without stronger integration:

- Agricultural productivity remains vulnerable to external shocks such as droughts, pollinator decline, pest outbreaks.
- Social inequalities may worsen, as food access is insufficiently addressed.
- Innovation potential in sustainable farming (through digital tools, microbial solutions, genomic techniques) may remain underutilised.

Conversely, bridging policy gaps with stronger science-policy linkages, equity considerations, and innovation uptake can enhance Europe's resilience to climate shocks, safeguard ecosystem services, and ensure equitable access to safe, nutritious food.

3.3 Policy Findings from the MAGNET model

The resilience of food systems includes farm level innovations and adaptations to increase production and yields in the context of a changing and uncertain climate. However, a broader perspective incorporating the food system's trends of population changes, consumer behaviour and preferences, trade, institutions, and governing policies is just as important as farm level adaptations. These larger systemic changes are important not just for food security but also for the food producers themselves, as these system changes in turn influence the prices for primary food products at the farm gate. Such an assessment of the larger food system must consider the main global drivers and uncertainties, rather than only viewing the EU agri-food sector or specific products in their current situation and in isolation.

By evaluating how agri-food systems might respond to various economic, social, environmental, and technological changes, we can identify potential vulnerabilities and develop strategies to enhance resilience at the finer scales. In this context, a modelling of possible future food resilience scenario was carried out (Moghayer et al., 2024). It primarily focused on providing quantifying larger system trends indicators that can be further used

Funded by the European Union

The ECO-READY project has received funding from the European Union's Horizon Europe Research and Programme under grant agreement n° 101084201

and interpreted by additional methods such as LCA and to guide the policy questions and analysis for the Living Labs in the EU Member States.

The methodology follows a four-step approach for the development of Scenario and Foresight Modelling. In preparation of the modelling exercise, focus groups involving researchers across scientific disciplines were held and identified sustainability indicators relevant to MAGNET, LCA and Intermediate modelling (Polakova et al. 2025). To create our quantified scenarios and foresight analysis, we consider both global and EU-specific influences. We use the Intergovernmental Panel on Climate Change (IPCC)-based Shared Socioeconomic Pathways (SSPs) to represent different global socioeconomic trends, which provide a range of plausible futures by considering factors such as population growth, economic development, and technological change. Additionally, we develop specific economy-wide scenarios for the EU, including all Member States hosting the Eco-Ready LLs, based on consultations with Living Labs and their insights on regional trends and challenges.

Our baseline scenario assumes a "middle-of-the-road" pathway (SSP2), a continuation of current trends, where the world experiences moderate economic and social challenges with moderate Gross Domestic Product (GDP) and population growth. To explore a wider range of possibilities, we also considered two alternative pathways. SSP1, or the “green road”: This pathway represents a shift towards a more sustainable future with further global integration, increased nature protections, increased investments in green technology, and a greater acceptance of the importance of sustainability by society at large. The green road scenario is in contrast to SSP3, or the “Rocky Road,” which is a pathway that represents a fragmented world with few global agreements being made or honoured. Lower investments in technology and a decreased interest in the environment and sustainability concerns society at large. The three contextual scenarios highlight divergent trajectories for socio-economic and environmental outcomes. Green Road represents an optimal path of balanced growth and sustainability, while Middle Road showcases partial success amidst persistent challenges. Rocky Road, on the other hand, underscores the risks of inaction and fragmented global cooperation. These pathways underline the critical need for proactive investment in education, technology, and governance to secure a resilient future.

The modelling tool employed was MAGNET, a multi-regional, multi-sectoral, Computational General Equilibrium (CGE) tailored for agri-food analysis. The analysis with the MAGNET model serves as a foundation for more granular analyses using LCA models and other intermediary models. The coupling of the different quantification approaches, including the MAGNET model, LCA and the intermediary models is recommendable for addressing climate-related “local” changes that interact with global changes (Polakova et al. 2025). This can be achieved by directly using MAGNET projections of the overall scenarios or by linking to MAGNET in follow-up tasks in other Work Packages.

Green Road emphasised sustainability and showed the most promising results for environmental sustainability and social wellbeing, with significant reductions in greenhouse gas emissions, land demand, and chemical fertiliser use. Energy prices in the EU rise significantly because of a tax on emissions but then level off as clean energy becomes a larger share of the energy mix. Adoption of sustainable diets and reduced food waste coupled with increasing technological efficiency and free trade results in a reduction in food prices. Food affordability increases as a stable and wealthier population spends on average less of its total income on food. A smaller agrifood industry also employs a smaller share of the total workers in the economy.

Funded by the European Union

The ECO-READY project has received funding from the European Union’s Horizon Europe Research and Programme under grant agreement n° 101084201

In contrast, Rocky Road prioritises increased use of fossil inputs over sustainability. This results in relatively low energy prices and an increase in agricultural productivity output per hectare. However, a disintegration of global trade increases prices for production inputs. This coupled with lower technological investment results in lower productivity per worker and makes Europeans less wealthy compared with the Green Road. Higher prices for production inputs, reduced access to global food markets and a significant increase in animal sources of protein results in an increase in agri-food prices and a larger share of total income spent on food despite the increase in food production in the EU. The Agri-Food industry in the EU becomes larger as a share of GDP and pulls in a larger share of the total workforce compared with the Green Road.

These results inform the policy recommendations and highlight that the food system is integrated into the global economy and linked with many larger societal trends. Therefore, while on-farm innovations and agricultural production increases are important contributors to food security, policymakers looking to influence the development of the system and enhance resilience should include elements beyond the farm in their policy package. Maintaining trade links with the rest of the world and a skilled workforce help keep costs down. Crucially food demand management, i.e., encouraging sustainable diets, can have a significant impact on the pressure on agricultural systems and in turn reduce food prices and increase affordability. As the Rocky Road scenario indicates, intensifying inputs to increase food supply will not be enough to keep up with increased food demand from unsustainable diets and an increasing demand for animal-based proteins.

3.4 Findings from the Stakeholders Analysis Informing on Society's Needs

Under Task 2.1, the stakeholder analysis conducted aimed to deepen understanding of the motivations, needs, perceptions, and constraints influencing actors within the European food system (Mousiadou et al., 2024). This work sought to examine both governance dynamics and consumer behaviour, recognising that resilience, sustainability, and food security depend simultaneously on institutional coordination and the daily choices of citizens.

The deliverable combines two complementary components: (i) a Delphi-based expert assessment analysing the relationships, power dynamics, and priorities of key food system stakeholders, and (ii) an EU-wide consumer survey investigating the psychological, economic and social drivers of sustainable food choices. The Delphi study, conducted by the Aristotle University of Thessaloniki, involved two rounds of structured consultation with experts representing four categories of stakeholders. Anonymous feedback, consensus scoring (using Kendall’s W and IQR), and qualitative interpretation enabled the identification of shared priorities, cooperation patterns, trust levels, and perceived governance gaps across the agri-food system. In addition, a quantitative online survey conducted by White Research collected responses from 2,785 consumers across all 27 EU Member States. The questionnaire assessed sustainability familiarity, willingness to pay, perceived barriers, environmental attitudes, behavioural traits (self-efficacy, time perspective, stress), and socio-demographic factors. Descriptive statistics, path analysis, and fuzzy-set Qualitative Comparative Analysis (fsQCA) were used to identify behavioural determinants and consumer profiles. Together, they provide a multi-layered understanding of how institutions, markets, and consumers interact, and where misalignments hinder progress towards sustainable, resilient, and socially just food systems.

Funded by the European Union

The ECO-READY project has received funding from the European Union’s Horizon Europe Research and Programme under grant agreement n° 101084201

The study highlights a dual message for policy. On the one hand, the social potential for a shift towards sustainable food choices is real and growing. There is widespread positive sentiment and willingness to pay for products with a lower environmental footprint. At the same time, the role of information, income status and reliable eco-labels emerges as a decisive determinant of behaviour. On the other hand, persistent barriers, notably higher cost perceptions, limited availability, and poor information, continue to undermine the actual adoption of sustainable choices by citizens. At the level of systemic governance, the Delphi study underlines gaps in policy coordination and adequacy. Failure to adequately cover the needs of small-scale producers, strong dependence on public funding, spatial concentration of production, and costs of adopting technologies, result in a system that, in its current form, does not adequately respond to future risks. The political interpretation is therefore evident. Without a focus on consumer empowerment (transparency, education, and affordability), a market that supports short supply chains, locality, and seasonality, and participatory governance mechanisms that connect production and consumption, the shift to more resilient and sustainable food systems will continue to be fragmented.

The policy related findings showed that, despite existing strategies, the link between supply side measures (e.g., supporting sustainable production) and demand measures (empowering consumers) remains incomplete. Experts agreed that policies do not adequately address the needs of small producers, while the current architecture does not prevent power concentrations and spatial dependencies. These distortions are passed on to the end user, limiting the variety and accessibility of sustainable options.

On the other hand, the study revealed significant information asymmetries and low trust, making it difficult for consumers to identify, compare, and verify sustainable options. The lack of uniform, verifiable labels and digital traceability exacerbates consumers' uncertainty on the shelf. Moreover, despite the intention to pay a reasonable premium, a large proportion of consumers face price barriers and limited availability of sustainable options. Quantitative findings indicate a willingness to pay extra (typically up to 10%), but not to an extent that exceeds commercial gaps or household budgets. In combination with the above, experts argued that the cost of adapting sustainable practices is high and lacks appropriate incentives, which is passed on to final prices, making sustainable options even more inaccessible. Finally, participants highlighted the absence of networks of cooperation, information, and participation of all stakeholders, including citizens and consumer organisations, thus undermining the acceptance and legitimacy of policies.

These gaps indicate that the food system, in its current form, is not sufficiently shielded against future shocks, while it lacks information transparency and participatory governance that effectively incorporate the voice of consumers. Overall, the findings converge on the need for consumer-centric planning, where information and traceability form the basis, economic accessibility functions as a necessary condition and short, local, and seasonal chains offer tangible benefits in terms of availability, quality and resilience of the food system. Supporting all of the above, the activation of civil society and society in general, has a multiplying effect, reducing information inequalities, increasing trust and facilitating social acceptance of interventions. With this combination, intention is transformed into solid action and sustainability goals are functionally linked to food security. At the policy level, the priority is a coherent, consumer-centric transformation that simultaneously addresses both demand and supply. To address the weaknesses of the agri-food system, as highlighted by the study, targeted interventions are proposed that transform theoretical intent into practical change.

Funded by the European Union

The ECO-READY project has received funding from the European Union's Horizon Europe Research and Programme under grant agreement n° 101084201

A main priority is the development of a unified and verifiable transparency framework, which will mandatorily link eco-labelling with digital traceability at batch or product level, integrating environmental, social, and health indicators. Such a framework will not only function as an information tool, but also as a mechanism to empower consumers, allowing them to compare, trust, and ultimately choose products consciously.

The affordability of sustainable products also requires realistic and fair financing tools. Subsidising compliance costs for small-scale producers and temporary tax incentives for verified products can smooth out prices without degrading quality. In this manner, the recorded, yet fragile, willingness to pay can be transformed into consistent purchasing behaviour.

At the same time, strengthening short supply chains and promoting local and seasonal products are practical levers for improving availability, reducing the environmental footprint and reviving trust between producers and consumers. These forms of market create resilience in the face of crises and contribute to balancing regional inequalities.

Additionally, targeted education and communication, aligned with demographic and spatial consumer profiles, can strengthen general sustainable behaviour, which proved to be the strongest predictor of green food choices. Information, when reliable and socially adapted, acts as a catalyst for transforming environmental sensitivity into consistent behavioural change.

Finally, the institutionalisation of permanent consultation channels with consumer organisations and the use of real-time data to monitor prices, availability, and waste can establish a culture of continuous accountability and feedback, crucial for the stability and resilience of food security in a multi-hazard environment.

In conclusion, policy-related findings reveal a food system positioned at a critical point of transition, balancing between the need to adapt to global challenges and the opportunity to reshape itself in terms of justice, sustainability, and participation. The essence of the findings indicates that change can no longer be imposed top down, but built through trust, transparency, and the active participation of citizens. The consumer, connecting policy, market, and society, emerges as a real agent of transformation. The transition to a sustainable and resilient food system is not simply a technological or economic goal. It is primarily a cultural undertaking, redefining our relationship with food, nature, and society. It is through this new collective consciousness that the food security of the future can be built.

3.5 Findings from Living Labs Engagement

This section presents the policy outcomes emerging from Subtask 5.1.2 "Results of Living Lab Network activities", which is based on the analysis of Living Lab activities and their scenario exercises. It summarises the methods used to derive policy recommendations and identifies preliminary policy gaps and the ways forward.

The ECO-READY Living Labs provide a unique bottom-up perspective for policy design, grounding recommendations in real-world practices and regional experiences. Scenario development was a central methodological tool, jointly elaborated by consortium experts and the LLs. Each LL identified its key product(s) and contextual drivers, focusing on the three main project pillars: food systems, climate change, biodiversity. Through participatory workshops and co-design sessions, five future scenarios were developed per LL (50 in total), covering the 2030–2050 horizon. These scenarios explored diverse

The ECO-READY project has received funding from the European Union's Horizon Europe Research and Programme under grant agreement n° 101084201

trajectories, from business-as-usual pathways to high-impact climate and biodiversity stressors, as well as innovative interventions such as regenerative practices, technological innovations, or market-driven sustainability models. While tailored to local contexts, the scenarios also reveal cross-cutting trends and shared challenges across European regions. These narratives form the empirical basis for further quantitative and qualitative assessments, including modelling with MAGNET and environmental and social evaluation through LCA. Together, they provide a robust framework to identify drivers and barriers to resilience and to translate them into policy objectives and recommendations.

Policy extraction followed a qualitative, iterative process combining local evidence, expert validation, and policy mapping (see figure 6). Early findings were consolidated through co-validation workshops and a structured Policy Recommendation Template. This framework guided LLs in translating observed outcomes into policy-relevant statements by:

1. Identifying key drivers and barriers in the transition to resilient food systems.
2. Mapping these against existing EU policy measures.
3. Revealing policy gaps and defining policy challenges.
4. Formulating targeted policy recommendations validated through expert consultation.

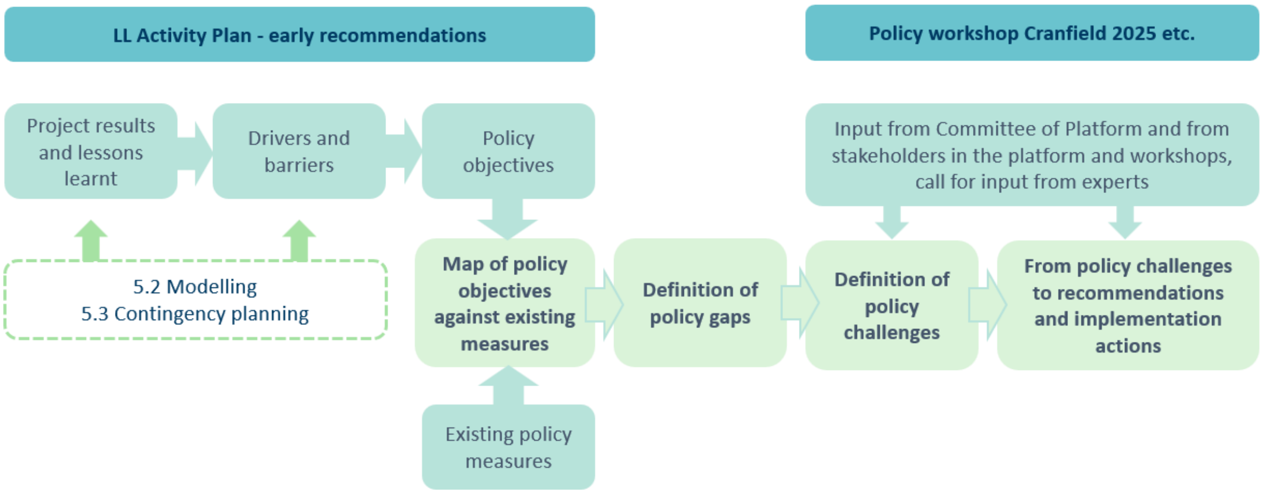


Figure 6: Policy recommendation process presented to the Living Labs in the October 2024 workshop

Following the ECO-READY Deliverables submission timeline, the policy extraction from Living Labs would be composed of two consecutive phases, one leading to early results until November 2025, the second one until the end of the project in November 2026. In phase 1, the Development phase of the LLs corresponds to the space dedicated for the extraction and demonstration of results and outcomes from these scenarios. This timeline was determined by the submission of LL documents showcasing their results and their first hands policy recommendations. The IUCN team and WP5 partners supported the LLs in the elaboration and compilation of their policy recommendation, by providing workshops showcasing methodologies for policy recommendation, discussion spaces for exchanges with LL and clarification on filling corresponding project Deliverables and updates on relevant European policies where LL results could have contributed. The second phase would lead to a second collection of outcomes from LLs, confronting the scenario results with MAGNET and LCA, along with external co-validation workshops. The outlines of respective phases 1 and 2 are more visually detailed in Annex 1 and Annex 2.

Funded by the European Union

The ECO-READY project has received funding from the European Union's Horizon Europe Research and Programme under grant agreement n° 101084201

To collect early policy recommendations, IUCN provided a Policy recommendation Template to LLs, detailing the relevant EU agriculture and Environmental policies and steps to achieve policy recommendations from the LL scenario outcomes (see figure 7). The template was introduced to LLs at the occasion of an online workshop in October 2024, allowing them to fill in corresponding WP3 documents. Further on, this template has been filled out by LLs and sent back to WP5 for analysis on two occasions: January 2025 and July 2025, for a compilation of their outcomes. Within the template, LLs have to complete a table following the steps of the policy recommendation process. All LLs completed the template formulating initial policy findings by September 2025. This allowed time for the content of the second policy workshop in July 2025 to be digested and integrated, supplemented by a comprehensive policy update document provided to the Living Labs to inform their reflection.

Scenario *Region, Product Objectives, Challenges/Risks*	**Mitigation and adaptation intervention** *Activity, Results, Lessons learnt*	**Drivers and barriers** *Monitoring of results, Enablers, Stakeholders*	**Policy Objective** *Potential link with current policies, Target audience, Mitigation measures, Scalability* *(optional)* **Policy Recommendation** *Policy gaps, Policy challenges, Implementation measures, References and associated links*
1.			
2.			
3.			
4.			
5.			

Figure 7: Table for collection of Living Labs' outcomes and policy recommendations

This second policy update workshop for LLs took place in July 2025, following the announcement of the EU Commission on the reform of the Common Agricultural Policy on 16 July - one identified key policy for contribution from the LL - and the Nature Restoration Regulation with his respective template for Member States, newly introduced in January 2025. This workshop was also an occasion for LLs to match their respective scenarios and policy objectives to relevant EU policies, identifying target areas for policy recommendations. LL were invited to provide eventual updates to their policy recommendation template. The outcome of this workshop was illustrated in a shared summary document *Workshop report from ECO-READY's Policy Training Workshop with Living Labs* (July 2025) and later in the *EU Policy Update briefing for ECO-READY's Living Labs* (September 2025), which would feed the thematic analysis.

Living Labs' engagement activities have resulted in initial policy findings, gaps, and recommendations. The Common Agricultural Policy, the Nature Restoration Regulation, the Soil Monitoring and Resilience Directive, and the Farm to Fork Strategy have been identified by Living Labs as the most relevant to them. The Common Agricultural Policy has been further highlighted as the major policy objective component by LL for their scenarios' outcomes contribution.

Some gaps remain, as the current elaboration and implementation of the Nature Restoration Regulation at Member State level impedes full understanding of this policy reach and implications for Living Labs. Further, not all scenarios were associated with a unique policy, suggesting that final policy recommendations of the project would have to target a mix of policies. In the end, each policy objective was associated with at least one key policy, with a particular focus on the CAP, suggesting the high relevance of the CAP for Living Labs activities outcomes and their final policy contributions.

Funded by the European Union

The ECO-READY project has received funding from the European Union's Horizon Europe Research and Programme under grant agreement n° 101084201

In addition, an analysis of the completed templates reveals common features across the Living Labs in terms of policy gaps:

- The fragmentation of food system policies around undercoordinated policies and administrations, including between different levels of governance (i.e., European, national, regional). For example, Living Labs criticise the lack of links between agricultural policy and water management policy, or agricultural policy and nature restoration policy, or environmental policies and agricultural education programmes.
- The poor interoperability of agricultural data at EU level. The possibility to analyse comparable data could facilitate policymaking and the transition of food systems. However, according to Living Labs, data collection methods remain too disparate and unreliable across Member States for comparable EU-level data.
- The weakness of multi-stakeholder dialogue in policy debate. Although the multiplicity of stakeholders makes consensus more difficult to achieve, all Living Labs support more inclusive governance.

In addition to policy gaps, certain policy recommendations are presented more directly by Living Labs:

- Promoting more sustainable and resilient agricultural practices, particularly in terms of soil health and water dependency. Living Labs advocate, in particular, for conversion to organic farming practices and principles, greater support for mixed cropping and intercropping, carbon farming, vertical farming, biocontrol, precision farming and digitalisation in agriculture.
- Improving farmers' access to independent advisory services, by increasing funding to ensure equitable access across all regions and for all farmers.
- Implementing market-oriented policies to raise consumers' awareness of sustainable food products and boost demand. Living Labs converge on a recommendation to improve promotional campaigns for agricultural products to better highlight environmental sustainability. Some also point to greenwashing in the market and advocate for sustainable labelling. Other Living Labs highlight the role that public procurement can play in raising the profile of sustainable products and recommend increasing their share in canteens, for example, but not exclusively for organic products. Finally, some argue for the role of taxation in making sustainable food more accessible in the market.

3.6 Policy Insights from the Contingency Planning and Regional Applications

This section synthesises the policy outcomes derived from Deliverable 5.2 *Contingency planning: A framework for dealing with contingencies in food security* and from the regional contingency-planning exercises implemented with Living Labs (LLs). It analyses how contingency frameworks can strengthen food system resilience and biodiversity protection under increasing climate pressures and identifies policy lessons emerging from these applications.

Ensuring access to affordable, safe, and diverse food is a core objective of European policy, deeply interlinked with biodiversity conservation and climate adaptation. Both food

Funded by the European Union

The ECO-READY project has received funding from the European Union's Horizon Europe Research and Programme under grant agreement n° 101084201

security and biodiversity are increasingly challenged by climate-related shocks, calling for proactive contingency mechanisms that enable rapid, coordinated responses. The ECO-READY project addresses this need by developing operational frameworks and regional case studies that explore how contingency planning can enhance the resilience of food systems across Europe.

European policy already recognises the need for crisis preparedness and systemic resilience within the Green Deal architecture. The Farm to Fork Strategy, the CAP, the Common Fisheries Policy (CFP), and the EU Biodiversity Strategy for 2030 all call for improved anticipation and management of food security risks. ECO-READY builds on these frameworks while aligning with the Sendai Framework for Disaster Risk Reduction (UNDRR, 2015), which emphasises four pillars of preparedness:

- Understanding disaster risks;
- Strengthening disaster risk governance to manage disaster risks;
- Investing in disaster risk reduction for resilience; and
- Enhancing disaster preparedness for effective response, with a focus on Building Back Better in recovery, rehabilitation, and reconstruction.

To operationalise these principles, ECO-READY adopts a systemic model based on Ericksen's food system framework and the *Oxford Martin Program's framework* on the *Future of Food* (Oxford, 2025). These models integrate environmental, social, and economic dimensions, linking natural hazards with food system performance and positioning food security as the central outcome of resilient systems.

Regional application of models is an operational challenge. The regional contingency exercises conducted with Living Labs translated these conceptual principles into practical applications. Each LL identified a region, key products, and specific hazards to be addressed (e.g., drought, heat stress, pest outbreaks, or market disruptions). Through participatory planning, LLs mapped vulnerabilities, defined preventive and adaptive measures, and developed draft contingency plans.

The operational framework was structured around four core activities:

- Risk definition activity: the specification of the region, the product, and target group of interest, and the hazard to be dealt with;
- Action design activity: the identification of objectives and of suitable actors that could provide activities for mitigating the effects of hazards;
- Evaluation activity: the calculation of the benefits and costs of selected activities;
- Coordination activity: the specification of coordination needs and opportunities for allowing timely realisation of necessary activities.

Looking ahead, gaps remain in projection capacities alongside missing data on status and upcoming future. The advent of artificial intelligence and especially Large Language Models (LLM) provide new opportunities to fill the data and judgement gap. Artificial intelligence used alongside the planning process and combined with knowledge available to planners allows to specify a first draft of a contingency plan. This draft could be subject to an evaluation by experts, tested in a simulated contingency and adapted to best fit the needs for assuring food security and biodiversity in a real contingency situation.

Funded by the European Union

The ECO-READY project has received funding from the European Union's Horizon Europe Research and Programme under grant agreement n° 101084201

Case studies with various Living Labs followed this approach in developing a first draft plan and could build on a standardised set of communication sets ('prompts') with AI tools. Building on such standardised sets allows easy development of draft plans for whatever contingency situation is to be dealt with and, in addition, allows an adaptation of an existing plan to any variations in an emerging contingency situation on short notice.

These activities suggest some policy implications and early recommendations. With climate change contingency situations are expected to increase, and communities, regions, and business networks should engage more in contingency planning. This is facilitated by new AI opportunities which can develop plans with limited resources and allow, through standardisation of communication sets, for easy replication of planning activities. The pre-condition is the availability of knowledge on planning process concepts, experience in interaction with AI tools, competence in a sensible integration of AI knowledge into planning procedures, the evaluation of AI-based draft plans, and the assurance of a plan's feasibility in terms of activities and the engagement of actors.

For reaching this level of competence, it is advised to establish a policy-supported training drive with a priority on rural communities and business networks which have primary responsibility for assuring food security and protecting biodiversity. Such a drive could be established through a combination of online teaching courses and on-site experimental planning initiatives.

In addition, some early recommendations are to:

- Integrate contingency planning requirements within the CAP Strategic Plans and Nature Restoration Plans of Member States.
- Establish an EU training and capacity-building initiative on food-system contingency planning.
- Use data, digitalisation, and AI to accelerate preparedness.
- Use AI-assisted planning and digital monitoring tools to compensate for information gaps and support dynamic plan updates. However, this requires guidance on data quality, transparency, and accountability to ensure trust and usability across Member States.
- Build capacity as a prerequisite for effective implementation. Establishing a policy-supported training initiative targeting rural communities, producer groups, and regional planners would strengthen both preparedness and biodiversity stewardship. Combining online modules with on-site simulation exercises can build the competencies needed for adaptive, evidence-based crisis management.

Funded by the European Union

The ECO-READY project has received funding from the European Union's Horizon Europe Research and Programme under grant agreement n° 101084201

4 Towards Robust Policy Recommendations for Resilient Food Systems

This chapter situates ECO-READY's policy-relevant findings in relation to one another through a Reflexive Thematic Analysis, in order to identify converging policy conclusions and to outline the process through which these will be translated into actionable policy recommendations.

4.1 Preliminary Policy Conclusions for the Resilience of the European Food System

The ECO-READY project yielded a set of preliminary policy conclusions on the resilience and sustainability of European food systems. As these insights are derived primarily from qualitative evidence, their analysis is grounded in Reflexive Thematic Analysis methodology (Braun & Clarke, 2006; 2021), following six steps:

- Data familiarisation: reading all qualitative materials to gain an in-depth understanding of their content and context.
- Data coding: generating initial codes to capture meaningful features of the data.
- Collating codes into themes: grouping related codes to form preliminary themes that reflect recurring and meaningful patterns in the dataset.
- Reviewing themes: refining and rethinking themes against both the coded extracts and the full dataset to ensure coherence and distinction.
- Defining and naming themes: clarifying the scope and analytical focus of each theme.
- Producing the thematic narrative: developing each theme into a clear and interpretative written account that supports the formulation of policy conclusions.

This methodology enables the systematic identification of patterned meanings across a heterogeneous qualitative dataset and allows the identification of policy conclusions within a wide spectrum of policy findings.

Reflecting the project's multidisciplinary and multi-stakeholders' approach, the analysis draws on a broad range of qualitative inputs produced across the Work Packages, including the above-synthesised deliverables and the reports documenting activities carried out with and by Living Labs. This diversity of sources captures a wide spectrum of academic, practitioner, and stakeholder perspectives, thereby strengthening the robustness of the thematic interpretation. A complete list of the materials included in the dataset selected for the Thematic Analysis is provided in the Annex in Table 3. Selected data include the deliverables and reports, whose policy related findings are synthesised in the previous chapter, as well as other projects outputs.

The thematic analysis identifies four core thematic cluster, around which we articulate policy related findings into policy conclusions. The first examines how the interlinked

Funded by the European Union

The ECO-READY project has received funding from the European Union's Horizon Europe Research and Programme under grant agreement n° 101084201

dynamics of agrifood systems, climate change, and biodiversity justify a systemic approach to food systems, highlighting factors that heighten food insecurity (such as climate impacts) and those that enhance resilience (such as biodiversity). The second explores how policy design can better reflect these interconnections, focusing on the need for stronger policy integration, gaps in the policy narrative, inclusive governance, and shortcomings in trade-off analysis. The third theme considers sustainable agricultural practices and innovative tools that can support more coherent and integrated food systems policies. Finally, the fourth theme highlights consumer vulnerability in the sustainability transition and underscores the need for policies that ensure equitable access to sustainable food.

a) Interdependencies in the agrifood-climate-biodiversity demand systemic food policies

Across the dataset, food security, climate change, and biodiversity are shown to be tightly interdependent. Climate change threatens all pillars of food security, while biodiversity enhancement consistently appears as a resilience factor. These interconnected dynamics justify treating food systems as part of a wider environmental and climatic nexus and call for integrated policy approaches.

Climate change intensifies risks across all pillars of food security

The dataset shows a clear, recurrent pattern: climate change jeopardises all four pillars of food security, particularly through its impact on agricultural productivity. The Systematic Review of Policies emphasises that “climate change and biodiversity loss are intrinsically linked and together pose a significant threat to global food security” (Di Gregorio et al., 2024a, p. 11), while the Literature Review proves that climate change threatens all four pillars of food security (Vu & Bourlakis, 2024, p. 34).

Availability emerges as the most frequently mentioned pillar at risk. As Vu & Bourlakis (2024, p. 56) explain, “critical changes in the climate (e.g., temperature, precipitation, ocean pH and salinity levels, extreme events frequency) […] can inhibit the development and wellbeing of crops and animals, leading to lower yields”. Long-term processes (e.g., ocean acidification) and short-term climatic shocks (e.g., droughts and heatwaves) are both shown to reduce productivity across diverse food systems. This extends beyond crops: the Systematic Review documents marine impacts, noting “a decrease in the dissolved oxygen content in seawater, lakes and river oxygen depletion cause profound implications for marine and freshwater life and fisheries” (Di Gregorio et al., 2024a, p. 40), while the Literature Review highlights water warming and salinity changes affecting aquatic systems. Livestock is similarly affected; the MAGNET modelling indicates that “livestock production plays a crucial role in meeting global food demand, particularly in regions with limited crop production, but it remains highly vulnerable to climate change impacts, such as reduced feed availability and declining productivity” (Moghayer et al., 2024, p. 44), echoed by the Literature Review stating that “warmer weather exposes livestock to heatstroke risks, affecting the quantity and quality of their products” Vu & Bourlakis (2024, p. 31). This illustrates that climate change has been documented as a driver of declining agricultural productivity across a wide range of staple foods in Europe, leading to availability risks.

These availability impacts in turn affect accessibility: as food production activities (farming, fisheries, husbandry, etc) are vital to the livelihood of a large population of the world, a reduction in the productivity of these activities will indirectly impede the ability of people to procure food for their own consumption” (Vu & Bourlakis, 2024, p. 65), a relationship also observed in the consumer survey: “high prices and reduced availability of sustainable agri-food products are observed, which limits their consumption” (Mousiadou

Funded by the European Union

The ECO-READY project has received funding from the European Union’s Horizon Europe Research and Programme under grant agreement n° 101084201

et al., 2024, p. 76). Climate change thus creates pressures on food security, with fluctuating yields and prices, that particularly affect vulnerable groups.

Climate change also affects utilisation, as illustrated by evidence from the Literature Review that “high CO_2 concentration leads to reductions in protein, mineral, and vitamin concentrations in a wide range of crops” and that “degrading marine environments can directly affect the nutritional values of seafood” (Vu & Bourlakis, 2024, p. 35 and p. 36)

The last pillar of food security, stability, is not left out and is also considered to be impacted by climate change. This is a corollary of the other pillars being affected, particularly due to declining availability, especially in the face of climate shocks or market price shocks. Overall, the findings demonstrate that climate change affects every dimension of food security, making it central to any systemic understanding of food systems. Thus, climate considerations must form part of each policy area, and particularly agricultural policy design.

Biodiversity enhances food system resilience to climate shocks

This sub-theme explores how, in opposition to climate threats, biodiversity gains significantly contribute to food system resilience. In the Literature Review, Vu & Bourlakis (2024, p. 56) expose that “a projection of continuous climate change in the future and the mitigation effects provided by biodiversity drivers contribute to the stability across the other three facets of food security”, stressing the long-term stabilising effects of biodiversity on food systems. Conclusions from the policy roundtable also echo this, emphasising that "mitigation strategies should reconnect climate, biodiversity, and food security" (ECO-READY, 2025a, p.2). The positive impacts of biodiversity span all four food security pillars, particularly “impacts of utilisation and stability are more pronounced with biodiversity drivers” (Vu & Bourlakis, 2024, p. 45).

Biodiversity enhances food availability through complementary species interactions and Nature-based Solutions, with the Literature Review noting that “many agricultural practices, which utilise the complementary and harmonising effects between diverse species, can lead directly to increased outputs” and “the use of nature-based solutions in supporting crop growth and yield, through utilising beneficial soil biota faunas and micro-organisms, natural pollinators, natural pests control, and so on” (Vu & Bourlakis, 2024, p. 45 and p. 55). The productivity pay-offs not only improve availability, with the greatest long-term benefit being improved stability, but also offset adverse climate-induced variability.

Biodiversity strengthens utilisation by supporting nutrient-rich food production. Evidence shows that seed diversity or complex grazing systems producing meat richer in fatty acids can enhance nutritional quality. As climate change deteriorates the nutritional quality of food, increased biodiversity can once again increase food security resilience.

However, the dataset also underlines that biodiversity benefits are context specific. According to Vu & Bourlakis (2024, p. 55) in the Literature Review “the approaches must be selected taking into account appropriate knowledge, as the effects of biodiversity cannot be generalised without care. For instance, not all mixtures of crops can generate positive outcomes on yields, and an unsuitable mix can reduce overall outputs.” This resonates with findings from the Systematic Review calling for “landscape-specific approaches to maximise biodiversity gains from agricultural practices, mitigate climate change effects and assuring food security” (Di Gregorio et al., 2024a, p. 66)

Funded by the European Union

The ECO-READY project has received funding from the European Union’s Horizon Europe Research and Programme under grant agreement n° 101084201

Overall, the data clearly positions biodiversity restoration as a critical resilience factor within the agrifood-climate-biodiversity nexus. As Polakova et al. (2025, p. 2) state in a recent ECO-READY scientific article “agrobiodiversity is an indicator that plays a crucial role in enhancing climate resilience in agriculture and the adaptability of cropping and farming systems to climate change”. Biodiversity is thus a shield against the adverse effects of climate change on production and a risk mitigation factor to consider in food systems policies. This call for the “improved integration of biodiversity conservation into other sectoral policies and funding mechanisms”, as expressed in another ECO-READY scientific article (Di Gregorio et al., 2024b, p. 15), especially between nature restoration efforts and the CAP.

Taken together, these findings underline the strong interdependencies between agriculture, climate, and biodiversity, thereby calling for a strong integration of climate and biodiversity into agriculture policies to support a systemic approach in the development of food system policies.

b) Fragmented food systems policy design fails to reflect agrifood-climate-biodiversity interconnections

Building on the previous demonstration of the linkages in the agriculture-biodiversity-climate nexus, which call for a systems approach to food, this second theme focuses on effective food systems policy design. Across the data, policy findings consistently describe a misalignment between the interconnected nature of agrifood, climate, and biodiversity challenges and the fragmented, siloed way policies are designed and implemented. This theme captures how gaps in policy integration, weaknesses in the policy narrative, limited stakeholder inclusion, and insufficient trade-off analysis jointly hinder the development of coherent, system-oriented food policies.

Lack of policy integration undermines coherent food system governance

This sub-theme reflects a strong pattern across the dataset: while food systems depend on intertwined agricultural, environmental, and climate processes, the policies regulating these domains remain highly fragmented. Lack of policy integration is a critical policy gap in food systems transformation.

The diversity of legislative frameworks referenced in the dataset—including the CAP, the Farm to Fork Strategy, the EU Climate Law, the Nature Restoration Regulation, the EU Pollinator Initiative, the Seed Regulation, the EU rural development policy, and various national and regional instruments—illustrates the complexity of the policy landscape that governs food systems. However, results repeatedly highlight fragmentation as a structural barrier leading to inconsistencies across goals and instruments. As the report from the Cranfield policy roundtable emphasises, "silos and fragmentation persist, making it difficult to create unified policies across food security, climate resilience, and biodiversity" (ECO-READY, 2025a, p.1).

The examples provided in the data illustrate how incoherence manifests at different governance levels. At EU level, the CAP is reported to be insufficiently aligned with food, climate, biodiversity, the EU Pollinator Initiative, and water policies. Similarly, biodiversity policy is considered to be insufficiently integrated with climate policies, public procurement rules and with agricultural policies with here a specific recommendation to align the Nature Restoration Regulation and the CAP. This is partly due to current insufficient approaches to modelling biodiversity indicators in state-of-the-art modelling tools, as evidenced by the latest scientific paper from ECO-READY (Polakova et al. 2025,

Funded by the European Union

The ECO-READY project has received funding from the European Union’s Horizon Europe Research and Programme under grant agreement n° 101084201

p. 14). At regional level, the CONCAT Living Lab illustrates the same dynamic, explaining that “this fragmentation results in disconnected instruments and overlapping incentive schemes. For example, water governance and drought contingency planning are managed separately from agri-environmental measures and CAP eco-schemes” (CONCAT, 2025, p. 28).

EU policy fragmentation hinders systemic responses. In a context where EU strategies increasingly rely on national implementation plans, coordination challenges across governance levels further weaken policy coherence, captured by the AIDEMEC Living Lab as a challenge of coordination between levels of governance (EU/national/regional) (AIDEMEC, 2025, p. 19). Taken together, the data demonstrates that the lack of integration across thematic policy areas and governance scales is a central policy obstacle to transitioning toward sustainable food systems.

Incomplete policy narratives limit systemic food policy design

This sub-theme explores how the framing of food systems in public and policy discourse influences the scope of policy design. The dataset reveals that the policy narrative around food systems is inconsistent and often incomplete, affecting whether and how environmental, climate, and consumption issues are incorporated into policymaking.

Policy-related finding from ECO-READY show that the prominence of sustainability in EU food debates fluctuates over time. Di Gregorio et al. (2024a, p. 27) point out in the Systematic Review of Policies that "the evolution of European policy documents on climate change, food security, and biodiversity not only reflects thematic shifts but also underscores a growing emphasis on sustainability transition and resilience in recent years". This indicates that policy narratives shape the issues considered relevant and the types of actions seen as legitimate. However, the policy roundtable in Cranfield later suggested that current EU narratives may be moving away from systemic sustainability, with claims such as "the Farm to Fork strategy was a central element of the Green Deal but has lost prominence, with a growing emphasis on competitiveness over systemic sustainability” and "strategic autonomy and economic viability are now dominant concerns in EU policy, with a shift toward increasing innovation tools for farmers" (ECO-READY, 2025a, p.1). These shifts underline that policy narratives are neither neutral nor stable: they depend on the political milieu to emphasise certain priorities, reinforcing or obstructing a systemic approach to food systems.

In addition, the data highlights blind spots within existing narratives. Consumption patterns and consumer behaviour are often excluded, as the policy roundtable from the Cranfield conference report puts it: "food is a political issue, and consumer diets and consumption patterns need to be brought back into the policy discussion" (ECO-READY, 2025a, p.1). Certain more specific topics, such as the impact of climate change on marine food systems as noted in the Systematic Review of Policies (see Di Gregorio et al. (2024a, p. 68)), are also noted to be absent from policy discourse. Analytically, this suggests that the narrative frames the topics to be debated and the stakeholders to be included. It also advances that an incomplete or fluctuating narrative leads to incomplete policies, since what is not part of the narrative is rarely part of the policy response.

Inclusive and participatory governance is essential to bridge policy silos

This sub-theme focuses on the role of governance in addressing fragmentation. As previously explained, the way in which the narrative frames the problem influences the definition of the relevant stakeholders at play. Across research and Living Lab policy

Funded by the European Union

The ECO-READY project has received funding from the European Union’s Horizon Europe Research and Programme under grant agreement n° 101084201

findings, there is a strong call for inclusive, multi-stakeholder policy processes as a prerequisite for coherent food system policies.

The dataset demonstrates consensus that diverse actors—farmers, researchers, civil society organisations, private sector actors, Living Labs—bring complementary expertise and perspectives essential for designing realistic, equitable, and evidence-based policies. For example, the Systematic Review of Policies shows that "if data and drivers used to formulate legislative policies are derived only from a top-down analysis, there is a concrete risk to not allow farmers to reach the envisaged targets" Di Gregorio et al. (2024a, p. 65), highlighting that farmers' involvement is key to designing workable measures. Similarly, civil society is seen as contributing to social equity goals, with findings from the stakeholders' analysis stating that "the involvement of Civil Society Organisations, according to the responses, is considered to be able to contribute to reducing inequalities and creating a 'nutritional democracy' regime" (Mousiadou et al., 2024, p. 77).

The data also emphasises that excluding stakeholders leads to narrow or unrealistic policies, summarised by Di Gregorio et al. (2024a, p. 60) in the Systematic Review of Policies as "the plurality of stakeholders involved in the policies determined a plurality of drivers and data that are taken as reference; therefore, according to the feedback of the policy actors it is extremely important that each stakeholder won't be excluded or less considered than others in this debate". Referring to the indicator design phase of policy making, Polakova et al. (2025, p. 13) also illustrate that stakeholder engagement "fosters a sense of ownership among various actors with relevance for policymaking. It ensures that the indicators used for model input data are pertinent and beneficial from multiple perspectives, enhancing their overall relevance and applicability".

In contrast, multi-actor, co-creative processes are perceived as mechanisms to weave together disparate knowledge bases and overcome fragmented policymaking. According to Living Labs' demonstration of results/outcomes reports, it includes "integrating co-creation and participatory design processes […], ensuring that diverse voices and local knowledge systematically inform decision-making" (THALLA, 2025, p. 39), through for example strengthened "links between field actors and decision-makers through participatory innovation mechanisms" (LOFS, 2025, p. 26), "exchanges between production stakeholders, local authorities, and research organisations" (LOFS, 2025, p. 25) or "roundtables that connect research, farmers, and policymakers" (PROBIO, 2025, p. 21).

This pictures that inclusiveness is not only a governance principle but a practical tool to counter fragmentation and improve policy integration. Each stakeholder contributes a distinct perspective that enriches the understanding of food system challenges and helps overcome policy fragmentation. In addition, their inputs, whether evidence supporting specific measures, analysis of differentiated impacts, or field-based insights into practical implementation, strengthen the relevance and the effectiveness of policy design, leading to more comprehensive and efficient policymaking.

Limited trade-off analysis obstructs systemic decision-making

This sub-theme addresses another recurring pattern: trade-offs are recognised across the data but insufficiently analysed within policymaking, limiting the ability to design coherent, system-oriented strategies. The findings show that transitions to sustainability entail perceived tensions, particularly between sustainable practices and agricultural productivity. Public perceptions reflect uncertainty, as underlined in the stakeholder's analysis: "the adoption of sustainable food production methods will have a positive

Funded by the European Union

The ECO-READY project has received funding from the European Union's Horizon Europe Research and Programme under grant agreement n° 101084201

environmental impact, but there is uncertainty regarding how this will happen and whether it will be able to meet global food demand" (Mousiadou et al., 2024, p. 76).

Results from the MAGNET model provides an empirical example of how trade-offs can be systematically examined. It shows that the Green Road scenario delivers strong environmental and social benefits while "there's a trade-off with food availability, which shows a slight decrease compared to the other scenarios. This suggests that a focus on sustainable and healthy diets might entail slightly lower overall calorie availability, although still sufficient to meet nutritional needs" (Moghayer et al., 2024, p. 36). However, this decrease does not compromise food security, demonstrating that trade-offs can be acceptable when analysed in context.

Experts speaking at the policy roundtable in Cranfield reinforce this, noting that "policy gaps are not the main issue; rather, the lack of cross-sectoral trade-off analysis and coherence is the key challenge" and advocating for digital tools to support the "development of simulation models to evaluate trade-offs across the food value chain" (ECO-READY, 2025a, p.2). In sum, without systematic trade-off analysis, policymakers risk defaulting to siloed decisions, reinforcing the fragmentation identified earlier. Integrating such tools into policymaking would support more holistic, evidence-informed strategies.

Evidence thus demonstrates that gaps continue to hinder coherent food-system policymaking. Findings therefore calls for genuinely systemic narrative and address of food issues overcoming a siloed vision, for participatory governance that meaningfully involves all stakeholders, and for the systematic use of trade-off assessment tools.

c) Sustainable practices, data, and tools to operationalise integrated food system policies

In response to the lack of integration in policies addressing the agriculture-climate-biodiversity nexus, several practical levers emerge across the dataset that can help reduce policy fragmentation in the agrifood-climate-biodiversity nexus: through climate- and biodiversity-resilient agricultural practices, the collection of harmonised agricultural data at EU level, and improved tools and advice for farmers. Together, these elements illustrate how concrete practices and enabling conditions can reinforce more coherent, integrated food systems policies.

Sustainable farming practices can bridge agricultural, climate, and biodiversity objectives

This sub-theme highlights the agricultural practices identified in the dataset as supporting both climate and biodiversity goals help bridge gaps between currently fragmented policy areas. The findings emphasise practices that improve resilience to climate shocks while strengthening ecological functions.

Water-resilient practices and soil health protection appear prominently, with Living Lab reports underlining the importance of supporting practices that keep soils rich and moist. These practices link agricultural resilience with biodiversity and climate objectives, demonstrating how policy integration can be anchored in concrete on-farm strategies.

Organic farming emerges as a key example of a holistic approach. In its demonstration of results/outcomes report, the PROBIO Living Lab in Czechia describe organic agriculture a comprehensive system that simultaneously addresses ecological, economic, social, and production goals" (PROBIO, 2025, p. 21) and recommends exploring "the introduction of a "system premium" (inspired by Switzerland) as an additional payment for a comprehensive

Funded by the European Union

The ECO-READY project has received funding from the European Union's Horizon Europe Research and Programme under grant agreement n° 101084201

package of organic practices such as soil protection, biodiversity, water retention, and rural employment" (PROBIO, 2025, p. 20). This illustrates how a multi-performance system can support more integrated policy design.

The data also highlights agroecological approaches as another way of bridging the gap between climate and biodiversity challenges and agricultural practices. Agroforestry in particular stands out as a means of improving yields and agricultural resilience. As Vu & Bourlakis (2024, p. 49 and p. 55) explain in the Literature Review "agroforestry can also contribute to a more resilient social-ecological system, especially when facing shocks and disturbances", "approaches such as agroforestry or animal and crop integration systems can sustain agricultural yields while diversifying the food supply". Crop diversification practices, including rotation (which was recognised within the 2021-2027 CAP's GAEC 7), mixed cropping, and intercropping, are similarly presented as mechanisms linking ecological and productive goals. Findings from the Literature Review show that "crop rotation and intercropping can lead to a considerable increase in yields of important crops" (Vu & Bourlakis, 2024, p. 45). In the policy section of their reports, the French LOFS Living Lab describes "mixed cropping [...] as a resilience factor" (LOFS, 2025, p. 26) and the Polish one EcoReadyMasuria recommends supporting "the uptake of mixed cropping systems, particularly intercropping [...], through dedicated CAP support, innovation pilots, and access to tailored machinery and advisory services" (EcoReadyMasuria, 2025, p. 38).

Seed diversification strategies are also central to climate-agriculture integration. Various sources underline the importance of wild crop relatives and underutilised crops to strengthen climate resilience and income diversification, linking seed choices to water management challenges. Living Labs in Germany and Hungary call for "subsidies for drought resistant seeds" (ESAPPIN, 2025, p. 23) and for policy that "supports farmers with water management challenges to encourage a shift towards more sustainable crops" (EcoVita, 2025, p. 63).

Other, approaches that stand out are precision farming, vertical farming, and carbon farming, which the first enable to combine agricultural practices and water management and the latter to combine agriculture and climate change mitigation.

Harmonised EU-level agricultural indicators and data inform integrated food policy design

This sub-theme captures a strong consensus that while lots of agricultural data exists at different scales of data collection and data statistics, the lack of interoperability of these different systems and lack of harmonised agricultural data at EU level limits evidence-based approaches to integrated food systems policymaking. The dataset identifies several ways in which better data could support resilience and policy coherence.

Data is first portrayed as a tool for anticipating and mitigating climate impacts. As Vu & Bourlakis (2024, p. 54) explain in the Literature Review, "the use of data and forecasts can be extremely helpful in mitigating the negative consequences of such extreme climatic events". It is also linked to structural transformation in sustainability transitions, with other findings from the Systematic Review of Policies stressing that "data and drivers should well ensure fair transition to sustainability for all the agri-food sectors also by establishing fair and well-recognised metrics and footprint calculations methods" (Di Gregorio et al., 2024a, p. 65). Behind the raw data, the latest ECO-READY's scientific article stresses that the data takes the shape of indicators as "statistical constructs which support decision-making by revealing trends in data", adding that "indicator monitoring is

Funded by the European Union

The ECO-READY project has received funding from the European Union's Horizon Europe Research and Programme under grant agreement n° 101084201

a precondition of policymaking, as effective policymaking starts with well-defined, measurable indicators" Polakova et al. (2025, p. 2).

To support policy coherence across the agriculture-climate-biodiversity nexus, "indicators must be quantitative and directly linked to the drivers that policymakers identify from the global to the local-scale agriculture" Polakova et al. (2025, p. 2). Yet, some challenges hinder such alignment. On the one hand, the lack of indicators and reliable datasets to assess the impact of agriculture on biodiversity hinders the integration of biodiversity protection and nature restoration objectives into agricultural policies such as the CAP (Polakova et al. 2025, p. 14). Water is seen as an issue especially overlooked within the CAP's indicators, as another ECO-READY scientific paper explains (Di Gregorio et al., 2024b, p. 11). On the other hand, the issue of harmonised sustainability metrics (carbon, water, biodiversity) is repeatedly cited as a barrier to integrated policymaking, as for instance underline by the Spanish Living Lab in the policy section of its report (CONCAT, 2025, p. 30)

However, the dataset points to significant challenges. Security concerns, particularly data ownership, privacy, and trust, are emphasised by Living Labs. CONCAT (Spain) for example notes the "lack of frameworks for secure and standardised agricultural data-sharing" and the need for "trust-building and clear data ownership agreements are essential" as well as "ensuring privacy and equitable data access" (CONCAT, 2025, p. 27).

Fragmentation and lack of interoperability across Member States are also prominent. The CONCAT Living Lab describes fragmentation whereby "different agencies maintain separate databases (climate, soil, water, biodiversity, CAP payments), and interoperability standards are underdeveloped" (CONCAT, 2025, p. 28). Research findings from the Systematic Review of Policies confirm that "there are different definitions and different methodologies of collecting data and this aspect can create some misunderstanding for policymakers" (Di Gregorio et al., 2024a, p. 64). As a result, recommendations converge on the need for an "EU protocol for agronomic data exchange for interoperability" as the Italian Living Lab puts it (AIDEMEC, 2025, p. 17).

Farmers require accessible tools and advisory support to enable the transition

A further pattern explored in this sub-theme concerns the lack of adequate tools, guidance, and support for farmers, which slows the adoption of sustainable practices and weakens climate resilience.

Advisory services emerge as a critical gap. Policy experts interviewed in Cranfield emphasise the need for "improved training and advisory services for farmers, as a key missing element in the transition to sustainable practices" (ECO-READY, 2025a, p.2) and Living Lab evidence confirms that "Farmers frequently lack access to training, technical support, and tailored advice" (PROBIO, 2025, p. 24). Multiple data sources stress the need for independent, accessible advisory networks, reflected in calls to "guarantee accessible, independent advisory services for farmers in all regions to strengthen resilience to climate shocks" (EcoVita, 2025, p. 63) and, to "strengthen the support capacities of local stakeholders: finance, train, and equip agricultural advisors" (LOFS, 2025, p. 25). It is especially underlined the need to improve these services through "increased funding for independent advisory services for organic farmers to support adoption of resilient practices" (PROBIO, 2025, p. 20); "train advisors in agroecological practises is important, thereby linking research work results with farming practises" (ECO-READY, 2025b, p.1).

Digitalisation represents another key support mechanism. Practitioners highlight gaps in the current CAP, noting that it "does not include specific lines for predictive technologies,"

Funded by the European Union

The ECO-READY project has received funding from the European Union's Horizon Europe Research and Programme under grant agreement n° 101084201

and pointing to a “lack of specific incentives for AI adoption in agriculture” (AIDEMEC, 2025, p. 18). Despite challenges related to ease of use, farming demography, and rural connectivity, the data consistently frames digital tools as essential for sustainability and resilience. At the Cranfield policy roundtable, participants emphasised the value of data for “benchmarking systems for assessing farm-level sustainability in a standardised way”, and for informed decision “promotion of GHG calculators for farms to support localised decision-making” (ECO-READY, 2025a, p.2). Overall, the dataset shows that well-funded, independent advisory services and stronger support for farm digitalisation together constitute essential enabling conditions for sustainable and climate-resilient agricultural transformation.

The findings therefore indicate that more integrated food-system policies depend on policymakers’ capacity to foster the uptake of sustainable farming systems through coherent CAP payments and strengthened agricultural advisory services. Advancing integrated policy design also requires the establishment of a harmonised, interoperable, and secure EU-level agricultural data framework and a common set of indicators.

d) Consumer needs and equitable access to sustainable food

This last theme elaborates on previous policy conclusions, notably those concluding that a systemic and integrated approach to food is needed, along with a policy narrative that takes consumers into account. Although consumers express strong intentions to shift towards sustainable diets, structural socio-economic inequalities limit their ability to contribute to food systems transformation. The data suggests that social policies targeting consumers can contribute to inclusive transition to sustainable food systems.

Socio-economic inequalities call for a social approach to sustainable food systems

This sub-theme highlights a consistent pattern across the dataset: consumers are willing to engage in sustainable food practices but remain constrained by economic barriers. In other words, the transition to sustainable consumption is shaped not only by environmental considerations but also by socio-economic factors.

The data shows that consumers display a strong aspiration to buy sustainable foods. As the stakeholder analysis shows, consumers seem to agree (52.8%) or strongly agree (4.8%) to pay extra for sustainable foods (Mousiadou et al., 2024, p. 59). At the same time, however, affordability emerges as a decisive constraint with the stakeholder analysis also “highlighting the importance of income, environmental awareness, and eco-labels in shaping sustainable food choices” (Mousiadou et al., 2024, p. 78). We therefore observe a dichotomy between consumers' intentions to consume sustainably and their ability to do so, which is mainly determined by the cost of food, i.e., its accessibility.

Yet, as highlighted in our first theme, food accessibility, determined partly by its availability, is a major challenge for policymakers. The MAGNET modelling scenarios further illuminate this tension by showing that economic growth alone does not guarantee either sustainable food systems or equitable food access. The modelling indicates that “the Green Road suggests that a focus on inclusive growth and sustainable food systems can significantly improve food access for vulnerable populations” while “the Rocky Road scenario prioritises economic growth but shows negative trends in most other indicators. It leads to increased GHG emissions, land demand, and chemical fertiliser use, while also showing a decline in food access and utilisation” (Moghayer et al., 2024, p. 31 and p. 36).

Funded by the European Union

The ECO-READY project has received funding from the European Union’s Horizon Europe Research and Programme under grant agreement n° 101084201

Taken together, these findings demonstrate that social aspects must be central to food systems policies. Environmental sustainability, economic resilience, and social inclusion cannot be treated as separate objectives: the transformation of food systems must address all three simultaneously. This conclusion is pivotal for the sustainable transformation of food systems and echoes the need to include consumption in the narrative and consumers in the governance.

Consumer-focused policies can increase access to and demand for sustainable food

Policy levers identified in the data could reduce consumer vulnerability by improving both the physical and economic accessibility of sustainable foods. The evidence points toward three main directions: public procurement, fiscal policy, and marketing tools.

Public procurement emerges as a significant but underused food accessibility lever. Several Living Labs report barriers to uptake, including “weak uptake of Green Public Procurement (GPP) criteria in regional and municipal contracting” (CONCAT, 2025, p. 30) and “limited recognition of public kitchens as drivers of organic demand: public institutions are not systematically included in strategies to promote organic consumption” (LivOrganic, 2025, p. 22). At the same time, they recommend that policymakers “increase the share of organic food in public catering (schools, hospitals, army, canteens)” (PROBIO, 2025, p. 21). These insights highlight that public institutions can play a dual role: structuring demand to stimulate sustainable markets while also increasing physical access to sustainable foods for citizens.

Fiscal policy is identified as a second key lever to accessibility, especially influencing affordability. The Hungarian Living Lab EcoVita illustrates this with existing VAT incentives, noting that Hungary applies reduced rates to some food items, although “this system is not based on scientific or health considerations, nor does it address environmental concerns like CO2 emissions” (EcoVita, 2025, p. 64). In response to the challenge of “high prices and reduced availability of sustainable agri-food products” as the stakeholder analysis puts it (Mousiadou et al., 2024, p. 76), this example demonstrates the potential of taxation to modulate the cost of food products. If aligned with environmental indicators, fiscal incentives could lower consumer prices of sustainable foods, addressing the affordability barrier highlighted earlier and supporting a fairer transition.

Finally, consumer awareness, driven by marketing and labelling, appear prominently across the dataset. Living Labs suggest introducing “public awareness campaigns on seasonal and local food consumption to support sustainable diets” (THALLA, 2025, p. 38), “awareness campaigns on sustainability & health benefits” (SECO-Collab, 2025, p. 18), “incentives for purchasing certified sustainable or organic agrifood products” (THALLA, 2025, p. 38), or “national promotional campaigns on organic farming. Current campaigns are often narrowly focused and highlight only selected aspects” (PROBIO, 2025, p. 21). Such measures could help overcome the visibility gap of sustainable foods as a whole, thus enhancing their accessibility to consumers.

Sustainability labelling is another recurring recommendation. Labelling is seen as essential for empowering consumers to make informed choices. Living Labs call for “promoting food labelling schemes that highlight product authenticity, origin, and environmental impact” (THALLA, 2025, p. 38) and “implementing a labelling system like NutriScore and Planet-score can help consumers make informed choices” (EcoVita, 2025, p. 65). This idea of sustainable food labelling is emphasised by other points such as the lack of “transparency in sustainability claims, allowing ‘greenwashing’ to undermine consumer trust” (CONCAT, 2025, p. 30) as well as the conclusion from the stakeholders analysis that “eco-labelling

Funded by the European Union

The ECO-READY project has received funding from the European Union’s Horizon Europe Research and Programme under grant agreement n° 101084201

and the existence of signs of environmental excellence could lead to more conscious choices of agri-food products and increase the demand and consumption of sustainable food" (Mousiadou et al., 2024, p. 76). These insights collectively point toward credible, standardised sustainability labels as tools for both visibility and accessibility of sustainable foods and consumers empowerment.

Thus, consumers are vulnerable in the transition of food systems. They suffer from a lack of availability and accessibility of sustainable food products. However, a series of socio-economic measures, combined with an environmental approach, can improve food systems overall. Food policies must put consumers back at the heart of the narrative and governance and must improve access to sustainable food through public markets, promotion and quality policies, and tax breaks.

4.2 Pathways from Evidence-Based Policy Conclusions to Actionable Policy Recommendations

The synthesis of policy-related findings and the thematic analysis have enabled the formulation of a preliminary set of policy conclusions. These conclusions represent the initial stage in a structured process leading towards the development of fully operational policy recommendations. These will be further elaborated and validated through an inclusive process involving all ECO-READY stakeholders. The trajectory towards their final formulation will progressively incorporate additional findings, which will provide incremental insights and further validation opportunities. Ultimately, the recommendations will be disseminated through tailored communication materials and integrated into the project's final outputs, ensuring their long-term visibility and uptake.

a) Co-development and validation of policy recommendations

The policy conclusions presented in the above section are directly derived from scientific research findings and multi-actor engagement activities implemented by the ECO-READY consortium. They constitute an essential intermediary milestone in the process of transforming findings into actionable and evidence-based policy recommendations. Building upon these conclusions, the forthcoming recommendations will aim to propose concrete, targeted, and operational measures to strengthen the sustainability and resilience of European food systems.

To ensure the robustness, coherence and policy relevance of these recommendations, the preliminary conclusions will undergo a refinement process through a dedicated policy co-creation workshop. In line with ECO-READY's interdisciplinary and multi-actor approach, this workshop will bring together project partners, representatives from the Living Labs, policymakers from participating territories, and external experts. These stakeholders will be engaged in a structured collective reflection on each policy conclusion, clarifying the issue at stake, identifying levers for policy intervention, and proposing concrete and actionable recommendations.

After the workshop, all contributions and insights will be harvested, analysed, and refined. This step will ensure consistency across recommendations, verify their alignment with ECO-READY's overarching objectives, and, where necessary, enable the prioritisation and fine-tuning of policy proposals in accordance with the evolving policy context and identified opportunities for impact.

Funded by the European Union

The ECO-READY project has received funding from the European Union's Horizon Europe Research and Programme under grant agreement n° 101084201

Finally, the refined set of policy recommendations will be submitted for peer validation to the Committee of Platforms and to all project partners during the project's final General Assembly. This validation stage represents the final step of the process and serves to guarantee the scientific soundness, legitimacy, and policy relevance of the recommendations. The resulting outputs will thus provide a coherent, evidence-based, and operational contribution to the European policy landscape, reinforcing the capacity of EU institutions and stakeholders to advance towards more resilient and sustainable food systems.

Incremental integration of new policy findings

The pathway towards final policy recommendations is designed to allow for the integration of the latest project results. Several ongoing activities are expected to provide particularly significant contributions to the refinement and consolidation of ECO-READY's policy recommendations. Specifically, the LCA, the extension of the MAGNET model to biodiversity dimensions, and an upcoming Delphi study, whose objectives and methodologies are outlined below, should provide further policy findings.

Firstly, building on previous work, an environmental and social Life Cycle Assessment Analysis will be conducted to assess how changes in farming practices, driven by the contextual factors outlined in the developed potential future scenarios for 2050, impact both the environment and society. For this purpose, the LCA methodology will be applied to the scenarios developed by the 10 ECO-READY Living Labs. The process for doing so is further described in Box 1. With results expected by May 2026, this analysis will help identify key hotspots, trade-offs, and opportunities for targeted interventions. These findings can be translated into policy-relevant insights by showing where actions are most effective, thus supporting evidence-based decision-making.

Box 1: Process used to apply the Life Cycle Analysis Assessment to Living Labs scenarios

For each Living Lab, environmental and social impacts of farming in 2050 will be assessed for one focus crop across three to four scenarios (described in Annex in Table 4). These scenarios draw from Deliverable 1.4 *Storylines developed for the Living Labs* and Deliverable 1.5 *Modelling future scenarios of food resilience*.

For scenario 1 (BAU or Middle Road) and scenario 2 (SSP3 or Rocky Road with high climate impact) the environmental impact will be quantified by adapting the LCA baseline impact assessments for the focus crops based on the MAGNET modelling insights (as depicted in Annex in Table 5). These insights inform expected changes (on national level) in key farming parameters (such as pesticide use, energy inputs, and reduced productivity due to climate stress) while capturing the broader socioeconomic conditions in which future farms are likely to operate.

The social impacts of scenario 1 and 2 will be assessed qualitatively, using insights from LLs collected during the ECO-READY conference held in Wageningen in October 2025. Using the participatory foresight method Futures Wheel, LL representatives reflected on how climate drivers may shape farming in 2050 for their focus crops. In addition, the middle-road and rocky-road scenarios may be explored through quantitative social impact assessment at the level of the wider agricultural sector (not LL level), using the Social Hotspot Database (SHDB) and MAGNET inputs to model sector-wide shocks, subject to methodological and model suitability.

Funded by the European Union

The ECO-READY project has received funding from the European Union's Horizon Europe Research and Programme under grant agreement n° 101084201

For a selection of the intervention scenarios (building on LL scenarios 3–5), environmental and social impacts will be assessed qualitatively. Fully quantifying the environmental impacts with an LCA would require defining entirely new, future systems for which no data currently exist, making this a prospective exercise beyond the scope of the project and not based on LL data. The qualitative environmental analysis will draw on insights from the LCA baseline measurements, results from the quantitative analysis of scenarios 1 and 2, and relevant literature. Social impacts will be assessed in a similar manner, mainly using insights from the Future Wheel exercise conducted during the workshop at the ECO-READY conference in October 2025 where participants explored how some of the emerging seeds of change, such as new practices or technologies, could shape farming in 2050 and what the social implications of this would be. The LL scenarios 3-5 are grouped into five "seeds of change" in Annex in Table 3.

In addition to the LCA, a biodiversity indicator module is being developed as an add-on to the MAGNET model. This new modelling tool will assess how different agricultural scenarios and land use changes may affect biodiversity on the national scale. The methodology used for integrating a biodiversity module into the MAGNET model is described in Box 2. By linking economic activities to biodiversity impacts, the tool can highlight where pressures on ecosystems are likely to increase, and where targeted actions may be most effective. The results will be available by May 2026 and will provide more findings on the linkages and trade-offs between agricultural activities and biodiversity hence further informing policy recommendations on ecological resilient food.

Box 2: Methodology used to develop a biodiversity module in the MAGNET model

The methodology for integrating a biodiversity module into the MAGNET model for centres on using "intactness-based" diversity impact factors sourced from the GLOBIO model (Alkemade et al., 2009), specifically Mean-of-species-abundance (MSA) factors. These MSA factors, which indicate the percentage of biodiversity loss due to human activities, are disaggregated by country, land type (e.g., cropland, forest), taxonomic group (currently plants and warm-blooded vertebrates), and driver (initially focusing on land-use, with CO2 and air pollutants planned for later steps). To calculate the overall biodiversity impact at the country level for land-use change within MAGNET scenarios, a weighted average of the land-type-specific MSA factors will be computed. The weights used are the corresponding hectares of land use change by type as simulated within the MAGNET scenarios. The resulting average MSA estimate will be calculated in GEMPACK and linked to the main MAGNET model, allowing for a comparison of pressures on biodiversity between Baseline and Scenario runs (cf. D5.4).

Moreover, a Delphi study will contribute to verifying and completing the conclusions and policy recommendations. The Delphi study offers a systematic mechanism for distilling and validating the cross-cutting insights generated across ECO-READY's research activities into policy recommendations that are both scientifically grounded and operationally feasible for European decision-makers. The methodology to be used is described in Box 3. By engaging diverse stakeholders across policy, practice, and civil society sectors in an iterative consensus-building process, the methodology ensures that complex, interconnected policy challenges related to food security, climate resilience, and biodiversity are refined through iterative expert judgment, transforming preliminary findings into actionable guidance that aligns with existing European Commission platforms and mechanisms. In that regard, the intention is to use the first results of the study to feed the policy work from Summer 2026.

Funded by the European Union

The ECO-READY project has received funding from the European Union's Horizon Europe Research and Programme under grant agreement n° 101084201

Box 3: Methodology of the Delphi study

The Delphi study methodology employs a structured three-round consensus-building process designed to synthesise and integrate policy recommendations across all ECO-READY Work Packages. Beginning with the collection and refinement of policy-related outputs from previous Work Packages, the study identifies and recruits diverse participants from partner networks spanning policy, practice, and civil society sectors across multiple European biogeographical regions.

The first questionnaire round, grounded in the synthesised policy recommendations and complemented by open-ended questions, elicits initial perspectives and establishes a baseline understanding of stakeholder views. This round's findings are analysed to rank recommendations by importance and map the level of consensus, informing the subsequent refinement process. The second round focuses participants' attention on the most significant recommendations identified in the first round, narrowing the scope while deepening engagement.

Following the analysis and reporting of second-round results, the third and final round explicitly targets achieving consensus on key policy recommendations identified as priorities. Throughout this iterative process, expert judgment and stakeholder input converge progressively toward shared conclusions about policy priorities. The final synthesis integrates these validated recommendations into a coherent, concise policy guide and tool that is comprehensively aligned with European Commission platforms and policy mechanisms, fulfilling the deliverable's core objective of ensuring ECO-READY policy outputs are directly compatible with existing EU governance frameworks.

Finally, beyond research, some final policy findings from the field will be expected by May 2026. The network of 10 LLs will wrap up their activities with a final report, which will once more feature a policy section. The template provided will support harvesting policy findings, gaps and recommendations that can feed ECO-READY’s final recommendations.

Over the course of the last project year, new results are thus expected to arise from the LCA analysis, MAGNET model, Delphi study and final LL reporting and can provide supplementary policy findings informing the development of ECO-READY’s final policy recommendations. To ensure the coherent integration of these outputs into the final recommendations, a new thematic analysis will be conducted to code and analyse each of these datasets. This iterative approach will maintain comparability with the initial thematic analysis, enabling an evaluation of whether these additional contributions reinforce previous policy conclusions, offer novel ones, or, where necessary, challenge existing ones. Such a process may prompt the refinement or adjustment of the final set of policy recommendations, thereby ensuring their robustness, relevance, and alignment with the evolving evidence base.

b) Tailored communication and integration within ECO-READY’s Observatory

The ECO-READY policy recommendations will be progressively formulated, validated, and refined throughout 2026. Their presentation, communication, and dissemination will continue until the project’s completion, with the overarching objective of ensuring their visibility, accessibility, and usability beyond the project’s lifetime.

Funded by the European Union

The ECO-READY project has received funding from the European Union’s Horizon Europe Research and Programme under grant agreement n° 101084201

Building on the multidimensional nature of food systems and the complexity of the policy frameworks that govern them, a series of thematic policy briefs will be published during 2026. Each brief will focus on a specific dimension of the policy recommendations, allowing for a more detailed examination of key aspects of the topic. This approach aims to deliver targeted, policy-relevant communication tools, providing decision-makers with a clear and structured overview of ECO-READY's proposals. The themes of these policy briefs will be defined in light of the results of the policy co-creation process and aligned with windows of opportunity within the European policy agenda in 2026. This alignment will help to maximise the relevance, strategic positioning, and potential policy uptake of the recommendations.

To ensure overall coherence, a consolidated policy recommendations brochure will also be produced before the end of the project. This document will compile all recommendations within a comprehensive and integrative framework, reflecting the cross-cutting elements and interlinkages identified across policy domains. It will further allow for the completion and refinement of the initial recommendations through the incorporation of additional findings and insights generated during the final stages of the project.

Finally, the integration of the policy recommendations into the ECO-READY Observatory will ensure their long-term visibility, accessibility, and usability. Furthermore, the forthcoming Policy Hub will serve as a dynamic mechanism for the continuous updating of the recommendations, drawing on new data, indicators, and evidence generated by the Observatory. This system will guarantee the continuity, policy relevance, and adaptability of ECO-READY's recommendations in response to the evolving dynamics of European food systems.

Figure 8 illustrates the overall process of formulation, validation, and presentation of the policy recommendations developed within the ECO-READY project.

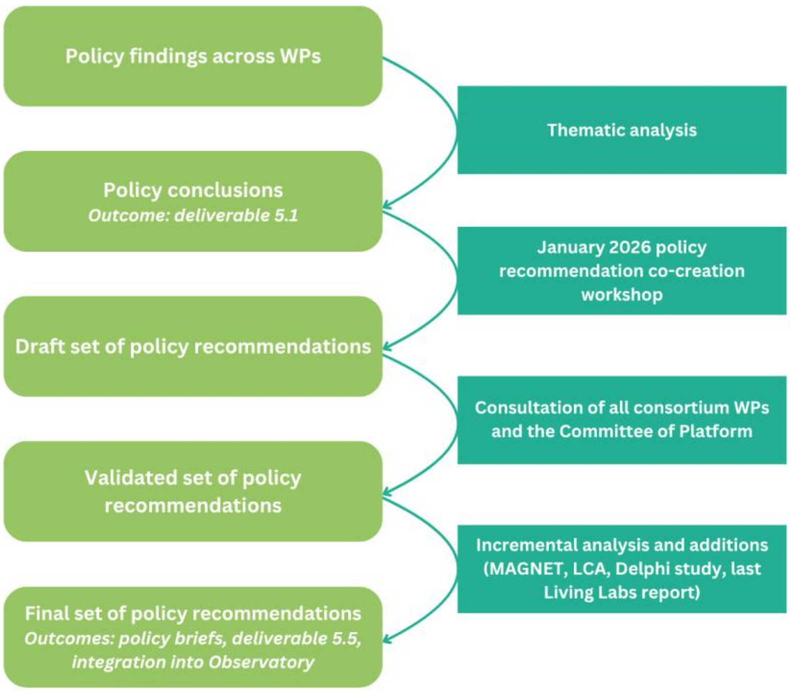


Figure 8: Overview of the process formulation, validation, and presentation of the policy recommendations

Funded by the European Union

The ECO-READY project has received funding from the European Union's Horizon Europe Research and Programme under grant agreement n° 101084201

5 Conclusions

This deliverable marks a pivotal step towards ECO-READY's policy recommendations for achieving an ecologically resilient European food system. It brings together the diverse analytical, empirical, and participatory policy-related outcomes generated across the project's Work Packages and Living Labs, following a multidisciplinary and multi-stakeholder approach. By consolidating this body of work, the deliverable establishes the analytical foundation upon which ECO-READY will build robust and actionable policy recommendations aimed at strengthening the resilience of European food systems in the face of climate change and biodiversity loss.

The work demonstrates that the **interdependencies within the agri-food-climate-biodiversity nexus call for systemic food policies.** Within this nexus, the analysis shows that climate change affects all four pillars of food security. Consequently, **policies cannot ensure food security without addressing climate change**, both through mitigation and adaptation. Biodiversity in agri-food systems acts as a buffer against the adverse effects of climate change on production. **Enhancing biodiversity therefore strengthens food system resilience.** As a policy conclusion, biodiversity conservation and restoration constitute key risk-mitigation factors that should be explicitly integrated into food systems policies.

Building on this evidenced interconnectedness, policy findings across ECO-READY converge on the observation that **fragmented policy design fails to reflect the agri-food-climate-biodiversity nexus.** An effective policy response must adopt an integrated approach encompassing the frameworks governing agricultural production, climate change mitigation and adaptation, and biodiversity conservation and restoration. **This calls for stronger coordination between European, national, and regional authorities, to break down silos, particularly in aligning CAP Strategic Plans, climate adaptation strategies, and National Restoration Plans.** Achieving this requires the adoption of a systemic view of food systems, ensuring that environmental, climate, and consumption dimensions are included in the policy narrative. Moreover, multi-stakeholder governance at all levels, moving beyond consultation towards genuine co-creation, and the systematic use of trade-off analysis tools are essential components of a coherent policy framework.

To support the integration of climate and biodiversity policies and drivers into agricultural policies, research and practical results from the Living Labs network have demonstrated that a range of practices and tools can be useful. **A series of agricultural practices should be promoted or further explored, including organic farming, agroecological practices such as agroforestry, mixed cropping and intercropping, the use of varied, underused and wild seeds.** Other, more single-benefit approaches, such as carbon farming and vertical farming, can be explored. Furthermore, **a harmonised European framework for the exchange of agricultural data is critical**, together with support for farmers, who are key to the transition of food systems, particularly through **improved advisory services.**

Finally, the findings underscore **consumer vulnerability and the need to ensure equitable access to sustainable food.** Ensuring food security in Europe requires a balanced combination of policy measures. The evidence shows that policies centred solely on economic growth cannot achieve food accessibility or sustainability. **Agricultural policies must integrate environmental and consumption considerations** alongside economic perspectives. This conclusion is particularly important as it addresses gaps identified throughout the analysis. On one hand, it confirms the need to include consumers within the food systems policy narrative and governance processes. On the other hand, it

Funded by the European Union

The ECO-READY project has received funding from the European Union's Horizon Europe Research and Programme under grant agreement n° 101084201

highlights the complementarity between environmental and social approaches to food. The analysis shows that, while all pillars of food security are affected by climate change and biodiversity loss, **food availability and accessibility emerge as the most pressing challenges for policymakers.** At the same time, the evidence indicates that consumers face limited availability and affordability of sustainable food products. Therefore, the interlinkages between food security drivers and consumer impacts require agri-food policies that integrate climate, biodiversity, and consumption dimensions, without which food security in Europe cannot be achieved. **Regarding sustainable food products, the results point to a range of policy options to improve accessibility for all consumers**, including the most vulnerable. These include quality schemes, promotional initiatives, fiscal mechanisms, and public procurement policies.

These conclusions constitute the analytical basis for ECO-READY's forthcoming policy outputs, ensuring that future recommendations remain scientifically grounded and aligned with the needs of European food system stakeholders. Over the final year of the project, **these conclusions will be further discussed with partners and translated into concrete policy recommendations**, maintaining ECO-READY's commitment to a multidisciplinary and multi-stakeholder approach and incorporating the project's latest outcomes.

Funded by the European Union

The ECO-READY project has received funding from the European Union's Horizon Europe Research and Programme under grant agreement n° 101084201

References

AIDEMEC. (2025). *Demonstration of results/outcomes* (internal report - unpublished).

Alkemade, R., Van Oorschot, M., Miles, L., Nellemann, C., Bakkenes, M., & ten Brink, B. (2009). *GLOBIO3: A framework to investigate options for reducing global terrestrial biodiversity loss*. Ecosystems, 12(3), 374–390. https://doi.org/10.1007/s10021-009-9229-5

Bertolozzi-Caredio, D., Severini, S., Pierre, G., Zinnanti, C., Rustom, R., Santoni, E., & Bubbico, A. (2023). *Risks and vulnerabilities in the EU food supply chain* (JRC135290). Publications Office of the European Union. https://doi.org/10.2760/171825

CONCAT. (2025). *Demonstration of results/outcomes* (internal report - unpublished).

Cranfield University; Vu, N.; Bourlakis, M. (2024). *Climate change, biodiversity, and food security nexus: A structured data review* (Deliverable 1.1, ECO-READY). https://www.eco-ready.eu/pdfs/ECO_READY_A_structured_data_review.pdf

Dettenhofer, M., Agyenim-Boateng, K. G., & Kandel, G. P. (2024). *Preliminary report of foods to be focused on by the Living Labs* (Deliverable 1.3, ECO-READY).

Di Gregorio, L., Latini, A., Nolfi, L., Stefanova, M., Notarfonso, M., & Bevivino, A. (2024a). Connecting data with CAP, Green Deal and other EC legislative frameworks & policies (Deliverable 1.2, ECO-READY). https://www.eco-ready.eu/pdfs/ECO-READY_D-1.2.pdf

Di Gregorio, L., Nolfi, L., Latini, A., Nikoloudakis, N., Bunnefeld, N., Notarfonso, M., Bernini, R., Manikas, I., & Bevivino, A. (2024b). Getting (ECO)Ready: Does EU legislation integrate up-to-date scientific data for food security and biodiversity preservation under climate change? *Sustainability, 16*(23), 10749. https://doi.org/10.3390/su162310749

ECO-READY. (2025a). *Summary of ECO-READY Policy Roundtable – Cranfield, April 3, 2025* (internal report - unpublished).

ECO-READY. (2025b). *Event report from the Limassol conference on Biodiversity, Food Security and Policy Making – Limassol, May 12-15, 2025* (internal report - unpublished).

ECO-READY. (2025c). *Event report from the Living Lab policy sorting workshop – Online, July 30, 2025* (internal report - unpublished).

EcoReadyMasuria. (2025). *Demonstration of results/outcomes* (internal report - unpublished).

EcoVita. (2025). *Demonstration of results/outcomes* (internal report - unpublished).

ESAPPIN. (2025). *Demonstration of results/outcomes* (internal report - unpublished).

European Commission. (2021). *EU Contingency Plan for Ensuring Food Supply and Food Security in Times of Crisis* (COM/2021/689 final). EUR-Lex - 52021DC0689 - EN - EUR-Lex

European Commission. (2023). *Drivers of food security* (Commission Staff Working Document SWD (2023) 4). https://commission.europa.eu/publications/analysis-main-drivers-food-security_en

Funded by the European Union

The ECO-READY project has received funding from the European Union's Horizon Europe Research and Programme under grant agreement n° 101084201

European Environment Agency. (2025). *Europe's environment 2025 – Main report: Europe's environment and climate—knowledge for resilience, prosperity and sustainability*. European Environment Agency. https://www.eea.europa.eu/en/europe-environment-2025

FAO. (2025). *Transforming food and agriculture through a systems approach*. FAO. https://www.fao.org/publications/?id=xxxx

Food and Agriculture Organisation of the United Nations, International Fund for Agricultural Development, United Nations Children's Fund, World Food Programme, & World Health Organisation. (2025). *The State of Food Security and Nutrition in the World 2025: Addressing high food price inflation for food security and nutrition* (ISBN 978-92-5-139937-8). Food and Agriculture Organisation of the United Nations. https://doi.org/10.4060/cd6008en

Fotakidis, D., Chatzikostas, G., Kabouridou, D., Chatzidimitriou, E., & Kyriakou, A. (2024). *Funding for third party planning and monitoring: 3rd report* (Deliverable 3.4, ECO-READY).

IPCC. (2019). *Climate Change and Land: an IPCC special report on climate change, desertification, land degradation, sustainable land management, food security, and greenhouse gas fluxes in terrestrial ecosystems*. https://www.ipcc.ch/srccl/

Jensen, L., & Hourdin, C. (2025). *Climate change impacts on food security in the European Union*. European Parliamentary Research Service Publications. https://www.europarl.europa.eu/RegData/etudes/BRIE/2025/775874/EPRS_BRI(2025)775874_EN.pdf

LivOrganic. (2025). *Demonstration of results/outcomes* (internal report - unpublished).

LOFS. (2025). *Demonstration of results/outcomes* (internal report - unpublished).

Moghayer, S., Dominguez Viera, M., Ghaderi Zefreh, M., Kristkova, Z., Doeschl-Wilson, A., & Manikas, I. (2024). *Modelling future scenarios of food resilience* (Deliverable 1.5, ECO-READY).

Mousiadou, A., Michopoulou, S., Kostopoulos, Y., Stamos, A., Kyriakidis, A., Altsitsiadis, A., Louvrou, N., Mattas, K., Tsakiridou, E., Anastasiadis, F., & Syndoukas, N. (2024). *Stakeholder analysis* (Deliverable 2.1, ECOREADY). https://www.eco-ready.eu/pdfs/ECO_READY_D2.1_Stakeholder_analysis.pdf

OECD. (2021). *Making better policies for food systems*. OECD Publishing. https://doi.org/10.1787/ddfba4de-en

Oxford. (2025). Oxford Martin Program's Framework on the Future of Food. https://www.futureoffood.ox.ac.uk/what-food-system

Poláková, J., Potopova, V., Smeets Kristkova, Z., Weststrate, J., van Zeist, WJ, Oosterwijk, A., Kolářová, M., Dominguez Viera, M., Zahradníček, P., Štěpánek, P., Bunnefeld, N., Dettenhofer, M., Manikas, I. (2025). From local to global and from global to local: Designing the protocol to model agriculture and climate resilience. *Environmental and Sustainability Indicators*, 27, 100855. https://doi.org/10.1016/j.indic.2025.100855

Prasad, G., Polakova, J., Hamouz, P. Hruska, A., Manikas, I., Varvaris, I. (forthcoming). The role of digitalisation in supporting farmers and strategic policies for food security and sustainability in Europe: A review.

Funded by the European Union

The ECO-READY project has received funding from the European Union's Horizon Europe Research and Programme under grant agreement n° 101084201

Probio. (2025). *Demonstration of results/outcomes* (internal report - unpublished).

Schiefer, G., & Sanchez, O. (2024). *Contingency planning: A framework for dealing with contingencies in food security* (Deliverable 5.2, ECOREADY). https://www.eco-ready.eu/pdfs/ECO_Ready_Del52_for_delivery_2.pdf

SECO Collab. (2025). *Demonstration of results/outcomes* (internal report - unpublished).

THALLA. (2025). *Demonstration of results/outcomes* (internal report - unpublished).

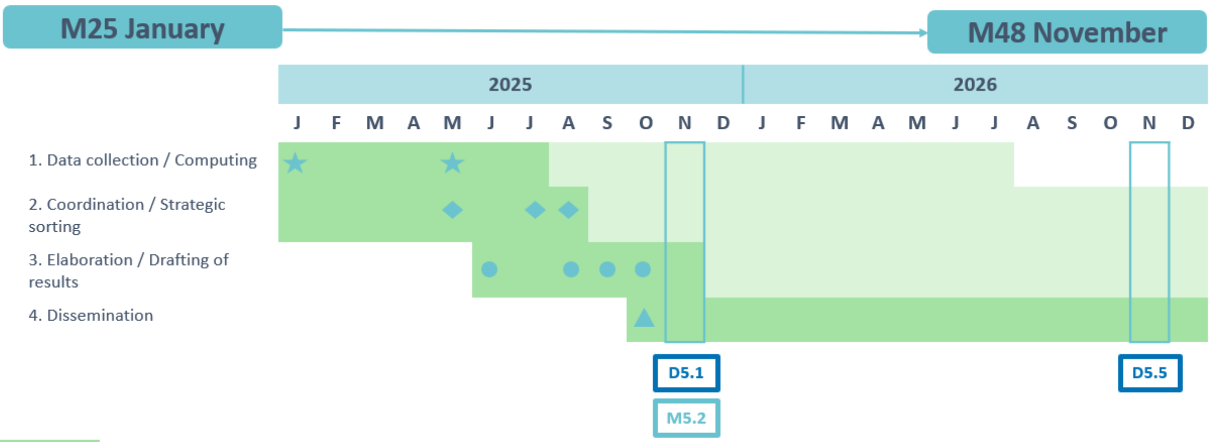
UNDRR. (2015). Sendai Framework for Disaster Risk Reduction 2015-2ß3ß. Report of the United Nations Office for Disaster Risk Reduction. https://www.undrr.org/publication/sendai-framework-disaster-risk-reduction-2015-2030

Funded by the European Union

The ECO-READY project has received funding from the European Union's Horizon Europe Research and Programme under grant agreement n° 101084201

Annexes

Table 1: Timeline for policy recommendation presented to Living Labs in January 2025 - Phase 1



Phase 1

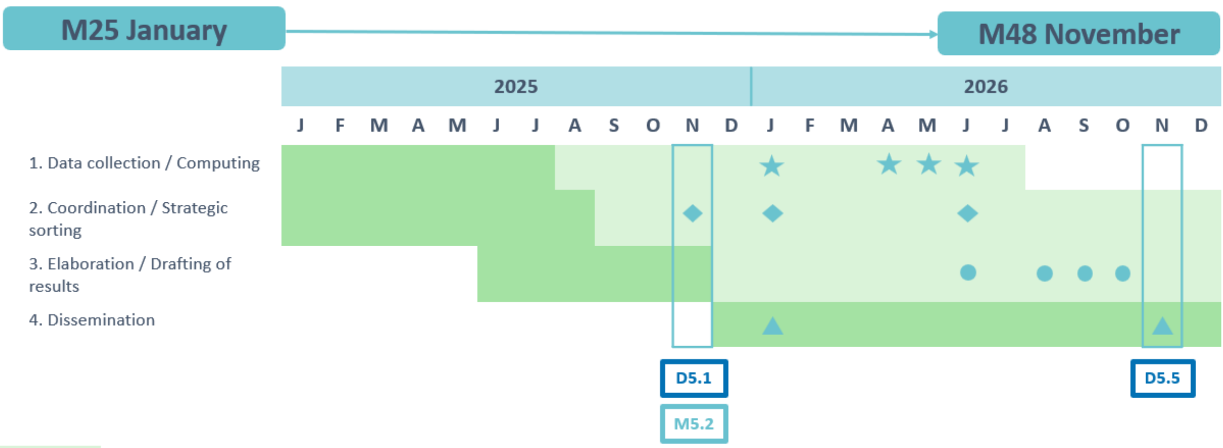
Collection from LL:
LL Policy Recommendation Template information (round 1 and 2)
Policy workshop results from LL

(May) Cyprus discussion with LL on MAGNET + LCA + Biodiversity Task Force
(July) Decision on policy recommendation framework / Coordination with WP4
Co-creation workshop with LL to align results
(August) Decision on validation process with CoP

Documents:
(June) Policy Brief agri/envi (1)
(August) Compilation of results to share with WP6 and WP4
(September) First draft policy recommendations
(October) Validation draft

(October) Workshop and presentation WCC

Table 2: Timeline for policy recommendation presented to Living Labs in January 2025 - Phase 2



Phase 2

Collection from LL:
(January) LL Policy Recommendation Template information (round 3)
(April) Policy workshop results from LL
(May) Results from MAGNET and LCA
(June) Final compilation

(November) Reflection from Phase 1
(January) Action plan for dissemination 2026
(June) Validation of final results compilation and share with WP4 and WP6

Documents:
(June) Policy Brief agri/envi (2)
(September) Draft update policy recommendations
(October) Validation draft

(2026) Workshops dissemination to EU
(November) Final conference
Integration of results into WP4

Funded by the European Union

The ECO-READY project has received funding from the European Union's Horizon Europe Research and Programme under grant agreement n° 101084201

Table 3: List of qualitative data composing the dataset used for the Thematic Analysis

Document title	Related Work Package	Status of the document
Climate change, biodiversity, and food security nexus: A structured data review	Deliverable 1.1, Work Package 1	Public
Connecting data with CAP, Green Deal and other EC Frameworks & Policies	Deliverable 1.2, Work Package 1	Public
Modelling future scenarios of food resilience	Deliverable 1.5, Work Package 1	Public
Stakeholder analysis	Deliverable 2.1, Work Package 2	Public
Demonstration of results/outcomes report - AIDEMEC Living Lab	Work Package 3	Non public
Demonstration of results/outcomes report - CONCAT Living Lab	Work Package 3	Non public
Demonstration of results/outcomes report - EcoReadyMasuria Living Lab	Work Package 3	Non public
Demonstration of results/outcomes report - EcoVita Living Lab	Work Package 3	Non public
Demonstration of results/outcomes report -ESAPPIN Living Lab	Work Package 3	Non public
Demonstration of results/outcomes report - LivOrganic Living Lab	Work Package 3	Non public
Demonstration of results/outcomes report - LOFS Living Lab	Work Package 3	Non public
Demonstration of results/outcomes report - Probio Living Lab	Work Package 3	Non public
Demonstration of results/outcomes report – SECO Collab Scandinavian Living Lab	Work Package 3	Non public
Demonstration of results/outcomes report - THALLA Living Lab	Work Package 3	Non public
Contingency planning: A framework for dealing with contingencies in food security	Deliverable 5.2, Work Package 5	Public
Event report from the Cranfield conference's policy roundtable, 3 April 2025	Work Packages 5 & 6	Non public
Event report from the Limassol conference on Biodiversity, Food Security and Policy Making, 12-15 May 2025	Work Package 5	Non public
Event report from the Living Lab policy sorting workshop, 30 July 2025	Work Package 5	Non public
From local to global and from global to local: Designing the protocol to model agriculture and climate resilience. *Environmental and Sustainability Indicators, 27, 100855.*	/	Published article

Funded by the European Union

The ECO-READY project has received funding from the European Union's Horizon Europe Research and Programme under grant agreement n° 101084201

Getting (ECO)Ready: Does EU Legislation Integrate Up-to-Date Scientific Data for Food Security and Biodiversity Preservation Under Climate Change? *Sustainability, 16(23), 10749.* / Published article

Table 4: Scenario descriptions and implications quantified (compared with base year 2025) using the MAGNET model.

These will serve as entry points for the LCA to evaluate environmental and social implications of the business-as-usual (BAU) scenario and a scenario characterised by high impact of climate change.

Note: scenario drivers in italics originate from the LL scenarios and are not included in the implications quantified by MAGNET. The implications in italics are retrieved from the scenario narratives developed by the LLs.

Geographic context		BAU	High impact climate change
General (integrated in the country-specific scenarios)	Reference	**SSP2 + additional insights LL scenarios**	**SSP3 + additional insights LL scenarios**
	Drivers	Moderate economic growth Input-driven productivity with ecological limits Mixed succes of climate mitigation and adaptation measures Meat demand continues to grow	Low investments in technology development and education Low climate adaptation measures Little international cooperation Sharp increase in consumption of animal-based products
Country specific scenarios			
Czech	Reference	**MAGNET middle road + LL scenario 1 (BAU)**	**MAGNET rocky road + LL scenario 1 (Extreme weather fluctuations)**
	Drivers	+38% GDP growth -6% population growth *Intensive agricultural land use* *Higher temperature, unbalanced precipitation*	+18% GDP growth -6% population growth *Increased frequency of heavy rainfall and flash floods*
	Implications	Land productivity: -5%[1] Agri. share of employment: -40% Chemical fertiliser use: -23% GHG emissions: -13% Water use: -6%[2]	Soil saturation, disrupted growing cycles and harvests Land productivity: +16% Agri. share of employment: +13% Chemical fertiliser use: +18% GHG emissions: +26% Water use: -4%
	Implications focus crop:	Employment (total): -30% Wages: +5%	Employment (total): -9% Wages: +59%

[1] These percentages reflect impacts at the national level and do not indicate changes per hectare. Rhis statement relates to all countries

[2] Difference in water use reflect changes in crop mix—i.e., shifts to more or less water-intensive crops, not changes in irrigation technology or productivity.

Funded by the European Union

The ECO-READY project has received funding from the European Union's Horizon Europe Research and Programme under grant agreement n° 101084201

	Buckwheat-organic[3]	Product volume: 0% Land demand: -4% Consumer price: -12%	Product volume: +12% Land demand: -2% Consumer price: +27%
Denmark	Reference	**MAGNET middle road + LL scenario 1 (BAU)**	**MAGNET rocky road + LL scenario 3 (Climate Change B)**
	Drivers	+37% GDP growth +5% population growth *Continued trend of increased interest in production and consumption of organic products*	+20% GDP growth +4% population growth *Warmer temperatures and increased risks of drought in spring and summer*
	Implications	Land productivity: +4% Agri. share of employment: -67% Chemical fertiliser use: -18% GHG emissions: 0% Water use: -4%	*Increased climate stress, irrigation dependency, high prevalence of weed* Land productivity: +54% Agri. share of employment: +12% Chemical fertiliser use: +37% GHG emissions: +40% Water use: -21%
	Implications focus crop: Barley (organic)[4]	Employment (total): -34% Wages: -14% Product volume: +7% Land demand: -1% Consumer price: -12%	*Potential increase in yield due to earlier start cropping season* Employment (total): +15% Wages: +56% Product volume: +59% Land demand: -2% Consumer price: +15%
France	Reference	**MAGNET middle road + LL scenario 1 (BAU)**	**MAGNET rocky road + scenario 3 '(From Bounty to Barren)**
	Drivers	+38% GDP growth +5% population growth *Milder winters, hotter and drier summers*	+25% GDP growth +6% population growth *Intensified climate extremes*
	Implications	Land productivity: +10% Agri. share of employment: -80% Chemical fertiliser use: -24% GHG emissions: -4% Water use: -22%	*Reduced crop quality, competition for water, salination* Land productivity: +28% Agri. share of employment: -3% Chemical fertiliser use: +27% GHG emissions: +42% Water use: +16%
	Implications mushrooms	*Reduced groundwater availability, high heat during summers and shift*	*Heat stress high impact on mushrooms production*

[3] These values represent general cereal data and do not specifically apply to organic buckwheat.
[4] These values represent general cereal data and do not specifically apply to organic buckwheat.

Funded by the European Union

The ECO-READY project has received funding from the European Union's Horizon Europe Research and Programme under grant agreement n° 101084201

		in pathogens threaten mushroom cultivation.	
Germany	Reference	**MAGNET middle road + LL scenario 1 (BAU)**	**MAGNET rocky road + LL scenario 2: Climatic shock**
	Drivers	+31% GDP growth -3% population growth *Longer droughts and irregular rainfall*	+13% GDP growth -5% population growth *Increased droughts*
	Implications	Land productivity: +6% Agri. share of employment: -55% Chemical fertiliser use: -26% GHG emissions: -6% Water use: -24%	*Severe water shortages* Land productivity: +26% Agri. share of employment: +10% Chemical fertiliser use: +19% GHG emissions: +38% Water use: -1%
	Implications focus crop: Barley	*reduced yields and Increased production costs* Employment (total): -37% Wages: -6% Product volume: +4% Land demand: -12% Consumer price: -10%	*Early maturation leading to suboptimal harvests, lower grain filling leading to less nutritious grains* Employment (total): -10% Wages: 57% Product volume: +29% Land demand: +10% Consumer price: +28%
Greece	Reference	**MAGNET middle road + LL scenario 1 (BAU)**	**MAGNET rocky road + LL scenario 3: Climatic shocks**
	Drivers	+48% GDP growth -6% population growth *Continuing current practices, ignoring the worsening impacts of climate change*	+31% GDP growth -7% population growth *Increased droughts and heatwaves* *Pollinator Collapse*
	Implications	Land productivity: +1% Agri. share of employment: -100% Chemical fertiliser use: -22% GHG emissions: -6% Water use: 0%	Land productivity: +22% Agri. share of employment: -42% Chemical fertiliser use: +17% GHG emissions: +29% Water use: -2%
	Implications focus crop: Tomato	*Soil degradations, pest invasion. Water scarcity. Areas becoming untenable for traditional tomato farming* Employment (total): -59% Wages: -2% Product volume: -1% Land demand: -15% Consumer price: -25%	*Water stress, heat damage, pollination issues leading to lower fruit set* Employment (total): -56% Wages: +30% Product volume: -4% Land demand: -19% Consumer price: +29%

Funded by the European Union

The ECO-READY project has received funding from the European Union's Horizon Europe Research and Programme under grant agreement n° 101084201

Hungary	Reference	**MAGNET middle road + LL scenario 1 (BAU)**	**MAGNET rocky road + LL scenario 2 (Vertical price tag)**
	Drivers	+48% GDP growth -10% population growth *Cold winters and hot and dry summers, increased risk flooding* *High energy prices*	+26% GDP growth -10% population growth *Exit of Hungary from EU leading to major trade challenges*
	Implications	Soil erosion Land productivity: +7% Agri. share of employment: -73% Chemical fertiliser use: -28% GHG emissions: -11% Water use: -27%	*Fluctuating energy prices* Land productivity: +16% Agri. share of employment: -9% Chemical fertiliser use: +17% GHG emissions: +28% Water use: -8%
	Implications focus crop: Leafy greens	*Production via conventional farming threatened due to water scarcity and flooding* *Risk of pest resistance* Employment (total): -48% Wages: +9% Product volume: -0% Land demand: -17% Consumer price: -18%	*High operation costs. High energy demand* Employment (total): -41% Wages: +61% Product volume: -0% Land demand: -13% Consumer price: +41%
Italy	Reference	**MAGNET middle road + LL scenario 1 (BAU)**	**MAGNET rocky road + LL scenario 2 - Climatic shocks**
	Drivers	+32% GDP growth -5% population growth *Slow adoption of technologies, increased frequence and severity of extreme weather events*	+16% GDP growth -7% population growth *Increase in severe droughts*
	Implications	*Labour shortages* Land productivity: +5% Agri. share of employment: -62% Chemical fertiliser use: -29% GHG emissions: -9% Water use: -14%	*Intensified water stress* Land productivity: +21% Agri. share of employment: -5% Chemical fertiliser use: +16% GHG emissions: 30% Water use: -1%
	Implications focus crop: Tomato	*Yield variability and quality issues, soil salinisation, water scarcity* Employment (total): -42% Wages: -16% Product volume: -7% Land demand: -14% Consumer price: -15%	Employment (total): -32% Wages: +50% Product volume: -3% Land demand: -11% Consumer price: +30%

Funded by the European Union

The ECO-READY project has received funding from the European Union's Horizon Europe Research and Programme under grant agreement n° 101084201

Poland	Reference	**MAGNET middle road + LL scenario 1 (BAU)**	**MAGNET rocky road + LL scenario 3: The broken breadbasket**
	Drivers	+56% GDP growth -10% population growth *Higher temperatures with more frequent heatwaves*	+36% GDP growth -9% population growth *migration to cities* *transition from small-scale to large-scale farms*
	Implications	*Heat and water stress* *Soil erosion* *Farm labour shortages* Land productivity: +5% Agri. share of employment: -87% Chemical fertiliser use: -20% GHG emissions: -10% Water use: -19%	*Loss of habitat and biodiversity* *Local farmers forced out of business* Land productivity: +19% Agri. share of employment: -16% Chemical fertiliser use: +20% GHG emissions: +24% Water use: -2%
	Implications focus crop: Barley	*Reduced yield and lower grain quality, new diseases pose a continued threat. Global grain price fluctuations* Employment (total): -51% Wages: +2% Product volume: +9% Land demand: -10% Consumer price: -15%	Employment (total): -36% Wages: +64% Product volume: +32% Land demand: +8% Consumer price: +33%
Spain	Source	**MAGNET middle road + LL scenario 1 (BAU)**	**MAGNET rocky road + Scenario 2-3: Climatic shocks**
	Drivers	+52% GDP growth +4% population growth *Rising temperature and disrupted rain patterns*	+31% GDP growth -1% population growth *Increases in extreme temperatures, droughts*
	Implications	Land productivity: +16% Agri. share of employment: -93% Chemical fertiliser use: -22% GHG emissions: +1% Water use: -30%	Land productivity: +25% Agri. share of employment: -21% Chemical fertiliser use: +18% GHG emissions: +40% Water use: 1%
	Implications focus crop: Wheat	*Production threatened due to droughts* Employment (total): -45% Wages: -16% Product volume: +10% Land demand: -12% Consumer price: -13%	*Reduced wheat productivity* Employment (total): -27% Wages: +34% Product volume: +36% Land demand: +13% Consumer price: +42%

Funded by the European Union

The ECO-READY project has received funding from the European Union's Horizon Europe Research and Programme under grant agreement n° 101084201

Sweden	Reference	**MAGNET middle road + LL scenario 1 (BAU)**	**MAGNET rocky road + LL scenario 2 (Powering up, profiting down)**
	Drivers	+54% GDP growth +11% population growth *More frequent and intense heatwaves, increased precipitation in winter and spring*	+34% GDP growth +8% population growth *Increase in energy prices*
	Implications	Land productivity: +11% Agri. share of employment: -77% Chemical fertiliser use: - 9% GHG emissions: +10% Water use: -6%	*Reduced purchasing power consumers* Land productivity: +45% Agri. share of employment: +6% Chemical fertiliser use: +32% GHG emissions: +44% Water use: +10%
	Implications focus crop: Leafy greens	*Potentially extended outdoor growing season, increased susceptibility to pests and diseases, heat stress,* Employment (total): -42% Wages: -16% Product volume: +6% Land demand: -14% Consumer price: -15%	*High costs of operation, reduced consumer demand* Employment (total): -32% Wages: 50% Product volume: +6% Land demand: -11% Consumer price: +40%

Table 5: grouping of the LL intervention scenarios (3-5) into “seeds of change”

Seeds of Change	Description	LL scenario narratives
Promotion of climate-smart agriculture	This seed centres on climate adaptation at the crop and farm level, i.e., how production systems respond to drought, heat, pests, and erratic weather. It includes genetic resilience, agroecological adaptation, and climate-smart inputs and technologies.	• Czech Republic: soil health and biodiversity for sustainable farming • Greece: Climate resilience & biodiversity loss • Germany: biocontrol implementation • Hungary: from seed to sky • Italy: advanced climate impact and integrated resilience • Poland: Regenerative solution • Spain: climate change and policy practices
Regenerative land stewardship	This seed emphasises landscape-level transformation, restoring soil, biodiversity, and ecosystem services through regenerative practices. It’s about how land is used, restored, and governed for long-term sustainability.	• Czech Republic: Enhancing soil health and biodiversity • Czech Republic: soil health and biodiversity for sustainable farming • Denmark: biodiversity • Demark: Land use • Germany-2: reduction in nutrient losses by 2050 • Poland: regenerative solution • France: Harvesting resilience: diversifying crops

Funded by the European Union

The ECO-READY project has received funding from the European Union’s Horizon Europe Research and Programme under grant agreement n° 101084201

Shifting consumer demand towards sustainable products	Shifting consumer preferences and market structures toward sustainable, local, and health-conscious food systems	• Czech Republic: seeding organic stewards • Greece: transition to organic & sustainable practices • Hungary: preference pivot (consumer preference) • Hungary: from seed to sky • Poland: Masuria Mosaic • Sweden: preference pivot (consumer alignment) • Sweden: from seed to savings
Clean Technology solutions	Accelerating the adoption of low-impact, high-efficiency technologies across agriculture to reduce emissions, conserve resources, and enable sustainable intensification. This includes energy systems, automation, circular inputs, and digital infrastructure.	• Denmark: specific scenario on land use • France: Loire agrotech revolution • Germany: Reduction in nutrient losses • Hungary: from seed to sky • Italy: Labour shortages • Spain-1: Integrated future • Poland: Masuria mosaic: smart agro-community • Sweden: Preference pivot • Sweden: from seed to savings
Social equity & community resilience	Empowering rural communities, youth, and small-scale farmers through inclusive policies, education, fair markets, and collaborative networks to build resilient local economies.	• Czech Republic: Seeding organic stewards • Poland: Masuria Mosaic • Italy: Labour shortage • Germany: Biocontrol implementation • Greece: Transition to organic and sustainable practices • Hungary: Reference pivot • Poland: Masuria Mosaic • Spain: Climate change and policy practices • Sweden: From fields to farmscapes • Sweden: From seed to savings

Funded by the European Union

The ECO-READY project has received funding from the European Union's Horizon Europe Research and Programme under grant agreement n° 101084201