



AGRIFOOD

4Future

D2.2

**Finding report on the state-of-the-art and
knowledge**



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Grant agreement number	101104597
Project acronym	AgriFood4Future
Project name	AgriFood4Future: Centers of Vocational Excellence in Smart Farming and Sustainable Food Systems

Deliverable number	D.2.2
Deliverable responsible	BGT Consulting Group
Work package	2
Authors	Aguiar, Bernardo and Morais, Vagner
Deliverable type	R - Document, Report
Dissemination level	PU - Public

Abstract

The "Agrifood4Future" (AF4F) project aims to address current and future challenges in the European agrifood sector by establishing Centers of Vocational Excellence (CoVEs) in six EU countries: Portugal, Spain, France, Belgium, Italy, and Greece. This initiative seeks to adapt and enhance Vocational Education and Training (VET) and Higher Education curricula to meet the urgent needs of digitalization, decarbonization, and sustainability within the sector.

This report provides a foundational step toward achieving AF4F's goals, organized around its four pillars: Digital Transition, Green Transition, Resilient and Sustainable Food Systems, and Business/Financial Sustainability & Resource Valorization.

It begins with an overview of AF4F's scope and its alignment with EU policy priorities, including the European Green Deal, the 'Farm to Fork' Strategy, and the EU Biodiversity Strategy for 2030. This highlights the project's commitment to enhancing the agrifood sector's appeal as a career path and contributing to the EU's dual transition objectives.

The report then introduces the CoVE Country Fact Sheets, compiled from extensive desk research and questionnaires distributed to consortium members. These fact sheets provide a comprehensive overview of the challenges in the agrifood sector, policy trends, and selected innovation priorities for each country, focusing on the analysis of 36 pioneering initiatives or best practices — six per country.

To conclude, the report outlines potential new or renewed green business models that, alongside the innovative projects detailed in the fact sheets, provide a blueprint for modernizing and future-proofing VET and Higher Education curricula. These models aim to create more resilient, sustainable, and technologically advanced career paths in the agrifood ecosystem across Europe.

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List of abbreviation

AF4F	AGRIFOOD4FUTURE
AKIS	Agricultural Knowledge and Innovation Systems
CAP	Common Agricultural Policy
CoVEs	Centers of Vocational Excellence
EC	European Commission
EU	European Union
F2F	Farm to Fork
WP	Work Package
VET	Vocational Education and Training

PART 1 - AF4F: UNDERSTANDING PROJECT SCOPE AND THE SIGNIFICANCE OF THIS ANALYSIS

1.1 Overview of the Project - Centers of Vocational Excellence in Smart Farming and Sustainable Food Systems

The AGRIFOOD4FUTURE project is an ERASMUS+ initiative that aims to establish Centers of Vocational Excellence (CoVEs) to respond to the evolving needs of the "agriculture of the future." The key priorities of the project revolve around digitalization, decarbonization, and sustainability in agriculture. The project will address the barriers to implementing innovative agricultural practices such as climate-smart agriculture, smart farming, precision agriculture, regenerative and organic practices, and a NEXUS-based approach to agri-food.

The project aims to educate and train agrifood professionals at various levels, providing them with the knowledge and skills required to adopt and implement advanced, smart, and sustainable practices. This will involve technical, soft, and entrepreneurial skills training and the promotion of the agri-food sector as a viable and attractive vocational career option.

1.2 Overview of Work Package 2 - Development of innovative teaching and training programmes in smart farming and sustainable food systems

For Work Package 2 (WP2), the goal is to identify the existing labor market and vocational training needs in the field of agri-food primary production, with a particular focus on unmet skills in the areas of digitalization, innovation, and sustainability. For that purpose, WP2 entails an analysis of the state-of-the-art practices and policy trends in the European agri-food sector and an overview of the best practices in smart and sustainable farming in the VET ecosystems.

1.3 Task 2.2 - Assessment of CoVE national policy priorities and the state-of-the-art on smart farming and sustainability in food production

To frame our work within the context of evolving trends and needs, we conduct a comprehensive assessment of the current and future scenarios in smart farming and sustainable food systems, focusing specifically on the project's four pillars: Digital Transition, Green Transition, Resilient and Sustainable Food Systems, and Business/Financial Sustainability & Resource Valorization.

We scrutinize various sources, including EU policy documents, research projects, and foresight reports, to discern key trends, challenges, opportunities, and policy priorities. This preliminary literature review and policy research is complemented by a consultation process with the consortium partners. This synergistic approach allows us to undertake an evaluation of policy priorities and the state of smart farming and sustainable food production in each of the project's participating CoVE countries: Portugal, Spain, France, Belgium, Italy, and Greece.

The results of this task culminated in the production of CoVE Country Fact Sheets, which offer a comprehensive overview of each country's agrifood sector challenges, policy trends, and selected technological and innovation priorities, while detailing six pioneering initiatives per country.

These fact sheets serve as foundational resources for the future development of tailored training programs and the fostering of innovation within the vocational education and training (VET) and higher education agri-food ecosystems in each country - the overarching aim of Work Package 2. In this way, our assessment will inform and guide the subsequent stages of our project, ensuring our interventions are evidence-based and contextually relevant.

PART 2 - EU'S VISION FOR THE FUTURE: EXPLORING POLICY TRENDS, FORESIGHTS AND GOALS IN SMART FARMING AND SUSTAINABLE FOOD SYSTEMS

The 'Centers of Vocational Excellence in Smart Farming and Sustainable Food Systems' project (AGRIFOOD4FUTURE) aligns with the European Union's strategic agenda to shape a greener and more resilient future.

We commence with an in-depth exploration of critical EU policies, prevailing trends, and overarching goals, notably beginning with the European Green Deal. This foundation allows us to shape our project's activities in harmony with the EU's strategic objectives.

2.1 The European Green Deal - reaching carbon neutrality by 2050

The [EU's Green Deal](#) is a long-term sustainable growth strategy launched in 2019 that establishes the European Union as a worldwide pioneer in championing environmental sustainability and vigorous climate action via an extensive set of concrete and measurable

actions. Subsequently, in 2021, the Member States signed the [European Climate Law](#) making it **legally binding for the EU to achieve a balance between greenhouse gas emissions and removals by 2050**, and to achieve negative emissions thereafter.

The success of this profound economic and societal climate-neutral metamorphosis hinges on important modifications to prevailing business models, an adaptation of skillsets, and a significant shift in consumer attitudes and behaviors.

The Green Deal **underscores the importance of smart farming and sustainable food systems in realizing these objectives**. The EU is invested in fostering a competent, future-ready workforce, emphasizing the necessity of proactive reskilling and upskilling.

Schools, training institutions, and universities play a significant role in this process by helping to develop and assess knowledge, skills, and attitudes on climate change and sustainable development. The proposed European Social Fund+ and updated Skills Agenda and Youth Guarantee are key instruments to facilitate this transformation.

The subsequent sections will delve deeper into relevant components of the EU Green Deal, such as the 'Farm to Fork' Strategy and the Biodiversity Strategy, examining their implications for smart farming and sustainable food systems. This analysis helps to create a solid foundation from which we can build the project, aligned with the most relevant EU policies, trends, and overarching goals.

2.2 'Farm to Fork' Strategy - for greener and more sustainable food production

The European Union's ['Farm to Fork' strategy](#) (F2F) aims to facilitate the **transition to a sustainable food system through several innovation steps**, which are **associated with new green business models**. These models are connected to the strategy's primary objective, which is ensuring sustainable food production.

One of the new green business models under the Farm to Fork strategy is **carbon sequestration by farmers and foresters**. Carbon sequestration practices, which involve the capture and storage of atmospheric carbon dioxide, contribute to climate neutrality and should be incentivized. This can be achieved through the Common Agricultural Policy (CAP) or other public and private initiatives. Furthermore, the EU is currently proposing a [Regulation establishing a Union certification framework for carbon removal](#), paving the way for robust, transparent, and accountable carbon renewals.

Advanced bio-refineries represent another new green business model within the strategy. These facilities can **produce bio-fertilisers, protein feed, bioenergy, and bio-chemicals**,

contributing to the transition to a climate-neutral European economy and creating new jobs in primary production. Additionally, these bio-refineries can produce **biogas from a variety of waste and residue sources**, such as from the food and beverage industry, sewage, wastewater, and municipal waste. Another element of this model involves **reducing methane emissions** from livestock by developing renewable energy production and investing in anaerobic digesters for biogas production from agricultural waste and residues, such as manure. To promote this, farmhouses and barns, which are often ideal for **solar panel placement**, should be prioritized in future [CAP Strategic Plans](#).

Lastly, the strategy emphasizes the need to further promote organic farming due to its positive impact on biodiversity, its potential for job creation, and its appeal to young farmers. The market for organic food is expected to continue growing, and consumers recognize its value. To incentivize this model, the Commission launched an [Action Plan on organic farming](#) in Q2 2021, in addition to CAP measures such as eco-schemes, investments, advisory services, and the Common Fisheries Policy (CFP) measures. This approach will help to reach the objective of having at least 25% of the EU's agricultural land under organic farming by 2030.

Table 1. Green Business Models - inspired by the F2F Strategy

Green Business Model	Description	Incentive Plan
Carbon Sequestration	Farmers and foresters capture and store atmospheric CO ₂ , contributing to climate neutrality.	Incentives through CAP, carbon farming initiative under European Climate Pact , development of regulatory framework.
Advanced Bio-refineries	Bio-refineries produce bio-fertilizers, protein feed, bioenergy, and bio-chemicals, as well as biogas from various waste sources.	Priority for solar panel placement in CAP Strategic Plans, accelerating market adoption.
Organic Farming	Organic farming has a positive impact on biodiversity, creates jobs, and attracts young farmers, with an expanding market for organic food.	Implementation of an Action Plan, and use of CAP measures like eco-schemes, investments, and advisory services, and European Commission proposal on the sustainable use of plant protection products

2.3 EU Biodiversity Strategy for 2030 - the business case for biodiversity

The [EU Biodiversity Strategy for 2030](#) aims to halt and reverse biodiversity decline in the EU, as part of a global effort to tackle biodiversity loss. The strategy is focused on setting protected areas, restoring ecosystems, enabling transformative change, and tackling the key drivers of biodiversity loss.

The EU Biodiversity Strategy requires a collaborative effort from businesses, public sectors, and society at large. The **strategy calls for the integration of biodiversity considerations into public and business decision-making at all levels**. This includes adjusting fiscal systems to reflect environmental costs, incentivizing nature-based solutions, and encouraging sustainable practices. By integrating biodiversity measures into economic and societal structures, the strategy seeks to drive long-term sustainable growth.

Innovation and skills development are fundamental to the implementation of the Biodiversity Strategy. Innovation aids in developing efficient nature-based solutions, incentivizing sustainable practices, and testing 'green' over 'grey' solutions. On the other hand, skills development, supported by initiatives like the new Skills Agenda, aids in the **transition to a green economy by reskilling the workforce across various sectors**.

Also, the [Council's proposal for a Recommendation on learning for environmental sustainability](#) emphasizes the importance of integrating knowledge of biodiversity and ecosystems into school, higher education, and professional training, thus fostering a well-equipped society to address and mitigate biodiversity loss.

Table 2. Green Business Models - inspired by the EU Biodiversity Strategy

Green Business Model	Description	Incentive Plan
Natural Capital Investment	Restoration of carbon-rich habitats and climate-friendly agriculture are among the top fiscal recovery policies. They offer high economic multipliers and a positive climate impact.	The EU plans to tap into this potential to ensure prosperity, sustainability, and resilience in recovery.
Organic Farming & Agroecology	Organic farming and agroecology can provide healthy food while maintaining productivity, increasing soil fertility and biodiversity, reducing the footprint of food production, and creating jobs.	At least 25% of the EU's agricultural land should be organically farmed by 2030. Organic farming also provides 10-20% more jobs per hectare than conventional farms. The EU Mission: A Soil Deal for Europe , targets degradation of soil, contributing to environmental and economic resilience.
Green Infrastructure	Planting trees and deploying green infrastructure to cool urban areas and mitigate the impact of natural disasters.	Inclusion of nature-based solutions in legislation and guidance on green public procurement, providing a driver of demand for businesses investing in these solutions.
Research & Innovation	Investment in research, innovation, and knowledge exchange to gather the best data and develop the best nature-based solutions.	The new Skills Agenda will focus on training and reskilling of the workforce across various sectors to support the transition to a green economy and fight against biodiversity loss.

International Natural Capital Accounting	Measuring the environmental footprint of products and organizations, including through life-cycle approaches and natural capital accounting.	Support for the establishment of an international natural capital accounting initiative , incentivizing businesses to incorporate biodiversity considerations.
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2.4 Empowering the Agri-Food Sector for the EU's Dual Transition: A Skills Agenda Approach

The [European Skills Agenda](#), launched in July 2020, is a strategic plan designed to furnish the European workforce with the necessary skills to navigate the dual transition – towards a greener economy and a digitised landscape. Among its flagship initiatives is [The Pact for Skills](#), a platform aimed at reinforcing collaborative efforts for skills enhancement via robust partnerships.

In the context of the AGRIFOOD4FUTURE project, we spotlight the [Skills Partnership for the Agrifood Ecosystem](#) - to be noted that the AF4F has joined the Pact for Skills. This ambitious commitment is designed to enhance the skills of the current workforce, bolster the appeal of the agri-food sector to younger generations, and offer a comprehensive, lifelong learning and career perspective to employers and workers alike. It has been established through the collective efforts of EU associations, organisations, social partners, national federations, and businesses.

The [2030 Digital Compass: The European Way for the Digital Decade](#), launched in March 2023, outlines the European Commission's vision for a digitally skilled population and highly skilled digital professionals as key elements for the EU's dual transition ambitions. Smart Farming, bolstered by intelligent edge computing applications, is emphasized as a sector that can leverage real-time agricultural data to advance services like harvest prediction and farm management and to optimize food supply chains.

The digital transformation of key ecosystems, including Agriculture, is seen as crucial. **Digital farming technologies have the potential to enhance efficiency and customization in the sector, improving sustainability and competitiveness.** Agriculture is recognized as a vital sector where digital solutions can help reduce global greenhouse gas emissions and pesticide use.

Fully aligned with the Green Deal, the [EU's 8th Environment Action Programme](#) (2022-2030) seeks to expedite the transition to a climate-neutral and resource-efficient economy. This programme sets a solid foundation for achieving the environmental targets of the UN Agenda 2030 and its 17 Sustainable Development Goals. It underscores six pivotal thematic areas: greenhouse gas emissions reductions, adaptation to climate change, a regenerative growth model, a zero-pollution ambition, protecting and restoring biodiversity, and reducing key environmental and climate impacts related to production and consumption.

PART 3 - LINKING AGRIFOOD4FUTURE PILLARS AND GOALS WITH EU POLICY PRIORITIES AND SUSTAINABLE GROWTH OBJECTIVES

The table that follows interconnects the project's core pillars with emerging R&D trends, shaping a more technologically advanced, sustainable, and prosperous European agricultural landscape. Furthermore, it aligns these advancements with the EU's prevailing policy directives and incentives.

Table 3 - Linking Project's Pillars, R&D Trends, and EU Policy Framework & Incentives

Project's Pillars	R&D Trends	EU Policy Framework & Incentives
Digital Transition	Precision farming, Robotics and automation, Decision support tools, Post-harvest management, ICT-based technologies such as IoT technologies (e.g., sensors in the field), AI and data science, Block-chain enabled connections, Virtual and Augmented Reality, Advanced earth observation from space, Digital marketing, Digital Innovation Hubs, Digital research needs from practice	Digital Europe Programme , Horizon Europe's Cluster 6 on Food, Bioeconomy, Natural Resources, Agriculture and Environment , 2030 Digital Compass, Skills Partnership for the Agrifood Ecosystem, EPRS study on Meeting the Green Deal objectives by alignment of technology and behaviour
Green Transition	Agroecology and organic farming, Indoor farming (e.g. vertical farms, hydroponics), New proteins, Biopesticides, New genomic techniques	European Green Deal, EU's 8th Environmental Action Programme, EC proposal on sustainable use of plant protection products, The EU Mission: A Soil Deal for Europe, EC proposal on plants obtained by certain new genomic techniques
Resilient and Sustainable Food Systems	Improving organic yields, Resource-efficient technologies (e.g., Optimised Water Management), Reduction of losses	Farm to Fork Strategy, Biodiversity Strategy 2030, Action Plan on organic farming , Ensuring resilient and sustainable use of EU's natural resources , EP's In-depth analysis " The Farm to Fork Strategy implications for agriculture and the CAP ", EC's Agricultural Market Brief " Organic Farming in the EU - A Decade of Organic Growth "

Business/Financial Sustainability & Resource Valorization	Biobased products, Carbon sequestration, Advanced bio-refineries, Economic analysis, Educational outreach and training, Business strategy and planing, Deeper understanding of food supply chains	Common Agricultural Policy (CAP) incentives for carbon farming, EU's New Action Plan on “A new Circular Economy” (e.g., incentives to Green Public Procurement), EC’s Joint Research Center report “Farmers of the Future” , EC 2023 Strategic Foresight Report “Sustainability and people's wellbeing at the heart of Europe's Open Strategic Autonomy”
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In the rapidly evolving landscape of agriculture and technology, our understanding must be rooted in current developments, yet always gazing towards future possibilities. The potential new green business models presented below are informed by rigorous examination, underpinned by the latest findings from the six analysed CoVE countries on Smart Farming and Sustainable Food Systems.

These models serve as evidence-based guides, mapping out the present advancements while hinting at future trajectories. As we assess the current state-of-the-art, it is essential for all EU stakeholders to recognize this transformative juncture in agriculture. Embracing these models means not just adapting to change but leading it, harnessing scientific innovation to forge a sustainable path for Europe's agrifood sector.

PART 4 - AF4F COVE COUNTRY FACTSHEETS

AF4F CoVE Country Factsheet Methodology

The AF4F CoVE country factsheets are structured to provide a shortlist of the most innovative initiatives unfolding in each country linked to the modernization and sustainability of the agrifood sector. They draw from inputs provided by consortium members, desk research, and the European Commission's (EC) sectorial recommendations and funding programs. These factsheets aim to deliver valuable and practical information about each country's prevalent challenges and groundbreaking projects that have the potential to propel both the individual CoVE countries and the EU's agrifood sector forward. The factsheets are organized into three main sections:

Part 1 - Overview of each country’s Agri-Food Sector: This section provides a concise summary based on the EC’s Recommendations to the Member States for their strategic plan for the Common Agricultural Policy (CAP). It offers an unbiased and insightful snapshot of each country's agrifood sector for an efficient comparative analysis among the six CoVE countries, highlighting key agricultural characteristics, challenges, and priorities.

Part 2 - AF4F Pillar Analysis:

- **Questionnaire Analysis:** Surveys with consortium members from six countries (Greece, Italy, Belgium, France, Spain, and Portugal) were conducted to identify key technological and innovative areas within the project's four pillars. Participants were then asked to rank the selected areas from 'Most' to 'Least' relevant.
- **Scoring and Averaging Methodology:** Themes were scored based on their ranking by respondents (5 points for 'Most relevant' to 1 point for 'Least relevant'), with these scores averaged to reflect collective country priorities.
- **Combined Analysis for Pillars 2 and 3:** Reflecting the interconnected nature of these pillars, we merged them in our analysis, resulting in three primary groupings: Digital Transition; Green Transition and Resilient & Sustainable Food Systems; and Business/Financial Sustainability & Resource Valorisation.

Part 3 - Case Studies and Best Practices: We selected six projects per country that align with the consortium's priorities and are instrumental in advancing the European agrifood sector. Each project was selected based on: its alignment with the prioritized areas identified by each country; whether it is situated in, or coordinated from, the CoVE country; its status as emerging, active, or recently completed (not earlier than 2022); and the availability of comprehensive online information.

For each project, we created a detailed table covering:

- **Strengths:** Key advantages and unique features of the project.
- **Target Audience:** Who the project is designed for or who benefits from it.
- **Collaborations:** Partners and stakeholders involved in the project.
- **Results & Impact:** The project's outcomes and its significance.
- **Alignment with AF4F Objectives:** How the project aligns with the overarching goals of the AF4F initiative.

4.1 Portugal - Factsheet

4.1.1 - Overview of Portugal's Agri-Food Sector

Portugal's agri-food sector is at a crossroads, embracing technological innovation and sustainable methods to address climate change and desertification challenges. Agricultural income, while below the national average wage, surpasses the EU average, highlighting the sector's potential despite a negative trade balance with EU countries. The emphasis on exports like olive oil and wine, alongside a positive trade balance with non-EU countries, showcases the international appeal and competitiveness of Portuguese agri-products. The rural depopulation marked by a negative net migration rate poses challenges but also opportunities for revitalizing these areas through sustainable and technologically advanced farming practices. Based on the "Commission Recommendations for Portugal's CAP Strategic Plan" and reflecting on the dual

transition (green and digital) framework, the following points encapsulate the pivotal aspects of Portugal's ongoing efforts in the agri-food sector:

- Fostering a Resilient Agricultural Sector:** The European Commission's recommendations highlight Portugal's vulnerability to climate-related challenges like desertification and biodiversity loss. Emphasis is placed on adopting innovative and technological solutions to address water scarcity, soil quality issues, and diversifying economic activities in agriculture.
- Enhancing Environmental Care and Climate Action:** Portugal faces an increase in agricultural greenhouse gas emissions. The Commission advises measures to reduce methane emissions from livestock, improve feed and manure management, and promote sustainable forest management. The focus is also on reducing ammonia emissions and enhancing renewable energy production.
- Strengthening Rural Socio-Economic Fabric:** Addressing rural exodus and the aging farmer population, the recommendations suggest support for young farmers, enhancing job opportunities, and ensuring the protection of agricultural workers. The importance of gender equality in rural employment is underscored.
- Promoting Knowledge, Innovation, and Digitalisation:** The recommendations stress improving the Agricultural Knowledge and Innovation System (AKIS), fostering better cooperation among stakeholders, and boosting digital skills and infrastructure in rural areas to enhance sustainable agricultural practices.
- Specific Strategic Recommendations:** These include improving agricultural competitiveness, adopting environmentally friendly practices, mitigating climate change, adapting to climate changes, preserving biodiversity, reducing pesticide usage, improving animal welfare, and promoting youth engagement in farming.

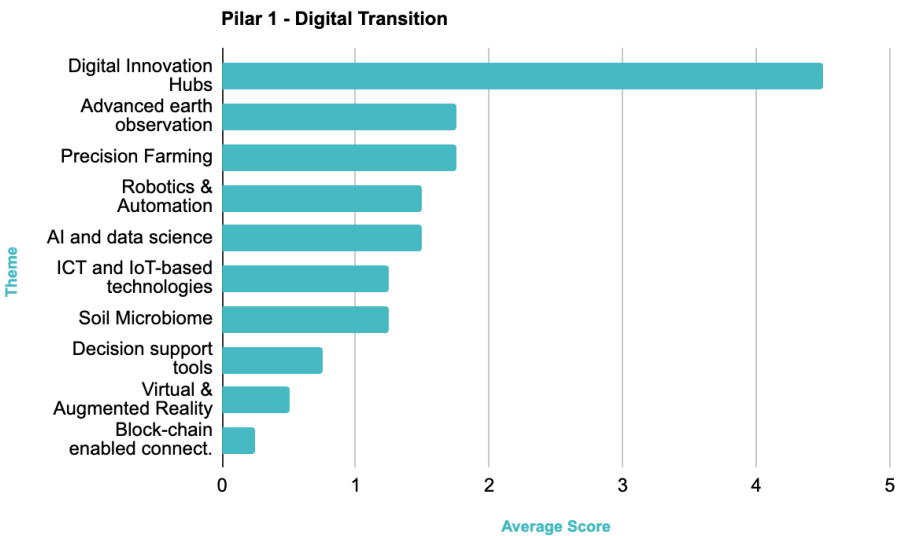
Table 4 - Portugal Factsheet: general agrifood characteristics

Country	Population	Rural Population	Number of Farms	Farm Characteristics	Agricultural Economy
Portugal	10.28 million	31% (Predominantly Rural)	259,000	Mostly small farms, family labor, and young farmers scarcity. Significant exports include olive oil and wine.	Below average agricultural income, positive trade balance with non-EU, negative with EU, depopulation in rural areas

4.1.2 - AF4F Pillar Analysis

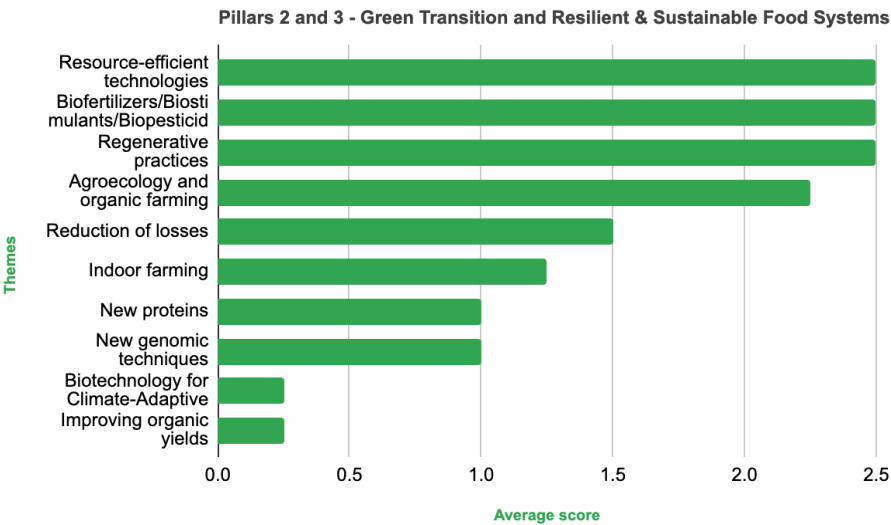
Pillar 1 - Digital Transition: Portuguese respondents’ priorities clearly emphasize Digital Innovation Hubs, highlighting a strong preference for platforms that facilitate digital advancements in agriculture. Other key areas such as Advanced Earth Observation, Precision Farming, Robotics & Automation, and AI and Data Science reflect an interest in leveraging technology for improved efficiency and insights. ICT and IoT-based technologies, alongside the Soil Microbiome, are recognized for their potential to enhance connectivity and understand soil health. Meanwhile, Decision Support Tools, Virtual & Augmented Reality, and Blockchain technology are identified as areas of growing interest, though currently less prioritized.

Figure. 1



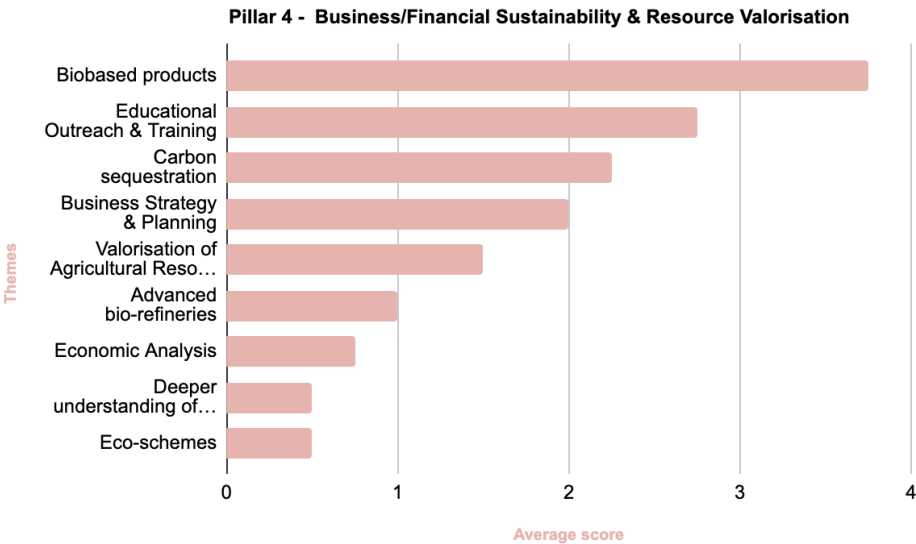
Pillars 2 and 3 - Green Transition and Resilient & Sustainable Food Systems - Portuguese preferences highlight a strong emphasis on Resource-efficient Technologies, Biofertilizers/ Biostimulants/ Biopesticides, and Regenerative Practices, followed closely by Agroecology and Organic Farming. This indicates a holistic approach towards integrating innovative and eco-friendly solutions in agriculture. Additionally, themes like Indoor Farming, Reduction of Losses, New Proteins, and New Genomic Techniques reflect a commitment to blending traditional practices with modern technological advancements for sustainable and resilient food systems.

Figure. 2



Pillar 4 - Business/Financial Sustainability & Resource Valorisation: This pillar's focus is notably strong on biobased products, leading with the highest average score, showcasing the priority given to developing sustainable goods from biological resources. Educational outreach and training are also emphasized, reflecting the importance of disseminating knowledge and enhancing skills in sustainable practices. Carbon sequestration is identified as a critical area, underlining a commitment to environmental stewardship through greenhouse gas reduction and soil health improvement.

Figure. 3



4.1.3 - Case Studies and Best Practices

Table 5 - Recent and Contemporary Innovative Projects by Portuguese Entities

Best Practice	AGF4F pillar	Main topics
SFT-EDIH	1 - Digital Transition	Digital Innovation Hubs, Soil Microbiome and Others
Scorpion	1 - Digital Transition	Robotics and Automation, Precision Farming
Biolog	2-3 - Green Transition	Agroecology and Organic farming
Arborea	2-3 - Green Transition	Regenerative Practices, New Proteins
Radiant Project	4 - Business & Resource Valorisation	Deeper Understanding of Supply Chains, Valorisation of Agricultural Resources
Hortee	4 - Business & Resource Valorisation	Deeper Understanding of Food Supply Chains

The Smart Sustainable Farms, Foods, and Trade European Digital Innovation Hub ([SFT-EDIH](#)) is at the forefront of fostering digital innovation in Portugal's agri-food sector. With a vision to support the industry's shift towards digitization and sustainability, SFT-EDIH provides a comprehensive suite of services, from training and digital literacy to advanced technological integration. Endorsed nationally and supported by the EU, the hub is dedicated to enabling a seamless digital transition across the value chain. Its [recognition](#) by the European Commission with the Seal of Excellence underscores its commitment to aiding SMEs in embracing digital, sustainable food systems in harmony with the 'Farm to Fork' or the 'EU Soil Strategy for 2030' strategies.

Criteria	Details
Strengths	SFT-EDIH excels in digitalizing the agri-food sector, promoting sustainable farming practices through advanced technologies like GIS (Geographical Information Systems), IoT, and blockchain.
Target Audience	Aims at a broad range of stakeholders including producers, processors, and distributors, offering services tailored to each segment of the value chain.
Collaborations	Boasts a consortium of 28 leading institutions in the agrifood sector, fostering synergy and addressing key digitalization challenges.
Results & Impact	Recognized by the European Commission with the Seal of Excellence, SFT-EDIH has significantly advanced the digital competence of SMEs in the agrifood sector.

Alignment with AF4F Objectives	SFT-EDIH’s services align closely with AF4F’s vision by supporting SMEs in the transition to digital, sustainable food systems, from digital literacy to certification and traceability solutions.
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The [SCORPION](#) project, coordinated from Portugal, is an innovative leap forward in agricultural technology, addressing the critical need for efficient phytopharmaceutical spraying in challenging terrains such as steep slope vineyards. This [EU-funded initiative](#), set to run from January 2021 to December 2023, is pioneering the development of a modular unmanned tractor designed for smart precision spraying. With a consortium of 10 partners across Europe, SCORPION combines expertise from vineyard associations, research institutions, SMEs, and large companies to advance the state of robotic agriculture. The project aims to enhance spraying efficiency, reduce environmental impact, and minimize human and animal exposure to pesticides by leveraging advanced technologies such as EGNSS (European Global Navigation Satellite System) receivers and ultraviolet light treatments, thereby revolutionizing precision farming practices.

Criteria	Details
Strengths	Development of autonomous precision spraying tools and modular unmanned tractors, enhancing efficiency in phytopharmaceutical application in difficult terrains.
Target Audience	Designed for steep slope vineyards, the technology has broader applications for high-value permanent crops like olive groves and fruticulture.
Collaborations	A consortium of 10 European partners including vineyard associations, robotics and agricultural machinery institutions, and companies dedicated to innovation.
Results & Impact	Aimed at increasing efficiency and safety in spraying, reducing pesticides usage, and lowering labor costs, while maintaining high crop yields.
Alignment with AF4F Objectives	Aligns with AF4F by focusing on innovation in agriculture technology, addressing sustainability, and reducing the environmental impact of farming practices.

[Biolog](#), initiated in 2021 by Food4Sustainability, is a pioneering project in Portugal that advocates for sustainable and regenerative food production. This initiative, which started in Idanha-a-Nova, Portugal's first Bio-Region, focuses on the principles of sustainability as defined in the 1987 Brundtland Report, emphasizing the balance between economic growth, environmental care, and social welfare. At its core, Biolog promotes organic farming, free from synthetic chemicals, ensuring animal welfare and the conservation of natural resources. It aims to unite organic production operators in a single space, fostering a movement towards more balanced and eco-friendly food production. Biolog's dynamic, free catalog connects producers,

processors, and retailers, showcasing over 343 organic and sustainable producers, thus bridging the gap between sustainable food producers and consumers.

Criteria	Details
Strengths	Advocates for organic and regenerative agriculture, emphasizing sustainable practices that respect nature's cycles and biodiversity.
Target Audience	Targets a diverse audience including producers, processors, and retailers, all linked to organic and sustainable food production.
Collaborations	Launched by Food4Sustainability in Idanha-a-Nova, Portugal's first Bio-Region, marking a significant step in promoting sustainable agriculture nationwide.
Results & Impact	Introduced the first national catalog of organic and sustainable producers, featuring over 343 operators, facilitating the shift towards sustainable practices.
Alignment with AF4F Objectives	Embraces AF4F's vision by promoting sustainable and regenerative agriculture, contributing to the environmental, economic, and social sustainability of the agrifood sector.

[Arborea](#)'s "Food without the Footprint" in Portugal showcases the Biosolar Leaf™ technology, focusing on sustainable microalgae cultivation. Supported by the [European Innovation Council](#), it aims to transform the food ingredient market with this carbon-neutral, soil-free method. Utilizing sunlight and CO₂, it is adaptable to diverse environments including non-fertile areas, targeting scalable, sustainable food production. Running until December 2023, the project seeks to validate its approach, emphasizing environmental benefits and efficient land use for global food demands.

Criteria	Details
Strengths	Innovative, carbon-neutral Biosolar Leaf™ system for microalgae cultivation. Highly efficient, scalable, and versatile, suitable for varied terrains, including urban spaces. Reduces the need for fertile land, minimizing biodiversity loss.
Target Audience	Food industry seeking sustainable ingredients, environmentally-conscious consumers, agri-food tech partners, and entities focused on reducing agriculture's environmental footprint.
Collaborations	Supported by the European Innovation Council (EIC), collaboration with industry partners for technology validation and market integration.
Results & Impact	Aims to reduce land use for agriculture, offering a sustainable solution to meet growing food demands. Goals include significant CO ₂ sequestration, reduced biodiversity impact, and the production of high-quality, sustainable food ingredients.

Alignment with AF4F Objectives	Contributes to sustainable food systems, aligns with goals of reducing environmental impact in agriculture, supports innovative farming practices, and fosters resilience in food production.
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The [RADIANT Project](#), coordinated by Universidade Católica Portuguesa, is a pioneering EU initiative focusing on underutilized crops like Bambara groundnut, lentil, barley landraces or wheat. This [project](#), which runs until 31 August 2025, includes partners from 12 countries and the FAO, aiming to revolutionize agriculture by promoting diversity and creating dynamic value chains. It targets a shift towards sustainable, diverse agroecosystems, impacting the EU agri-food sector by introducing new, sustainable crops and practices, and fostering shorter, more efficient value chains.

Criteria	Details
Strengths	Promotes diverse crops like lentils, and barley landraces, increasing agrobiodiversity. Works with global entities for broader, sustainable agricultural practices.
Target Audience	Targets farmers, academics, industry experts, and policymakers. Focuses on integrating underutilized crops into mainstream agriculture for diverse stakeholders.
Collaborations	Involves collaboration with Underutilised Crops Cluster and AURORA Farms, setting examples of innovative, sustainable farming models.
Results & Impact	Aims to create sustainable agroecosystems, establish shorter, efficient value chains. Seeks to influence EU's food system towards sustainability and resilience.
Alignment with AF4F Objectives	Aligns with AF4F by promoting diversified agricultural practices and reducing reliance on monoculture, contributing to ecological and economic benefits.

[The Soil Health and Function Laboratory](#) (the Lab), established by Food4Sustainability (F4S) and incubated at ArrudaLab, is Portugal's premier facility focusing on soil functionality and health, providing farmers with customized advice for crop improvement and adaptation. Utilizing next-generation DNA sequencing, the Lab analyzes soil microbiota to recommend sustainable agricultural practices. As a representative of the Becrop® test by Biome Makers, F4S delivers detailed reports on soil nutrition, stress resilience, and microbial disease risks, advising on biostimulants, biofertilizers, and regenerative practices. These recommendations empower farmers to enhance nutrient management, pest control, and yield, reducing environmental impact and promoting land health.

Criteria	Details
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Strengths	Soil microbial analysis provides precise and comprehensive insights into the microbial communities present in the soil and their functions, allowing for targeted interventions and adjustments.
Target Audience	Farmers, agricultural consultants, and researchers
Collaborations	Involves a collaboration between the municipality (Arruda dos Vinhos), a SME from the innovation ecosystem (BGI), a collaborative laboratory (F4S) and farmers' associations.
Results & Impact	Soil microbial analysis (Becrop®) provided by Food4sustainability contributes to the improvement of soil health, by minimizing the use of chemical fertilizers and pesticides, and reducing the environmental impact by transitioning to more sustainable practices
Alignment with AF4F Objectives	Contributes to sustainable food systems, aligns with goals of reducing environmental impact in agriculture, supports innovative farming practices, and fosters resilience in food production.

4.2 - Spain Factsheet

4.2.1 - Overview of Spain's Agri-food sector

Spain's agri-food sector is a key contributor to its economy, marked by a wide range of climatic and topographical conditions. The country is divided into 17 regions, and, according to the Spanish Ministry of Agriculture, Fisheries and Food, 16% of its population lives in rural areas. Agricultural diversity is a hallmark, with Spain leading EU production in olives and fruit. The sector comprises approximately 915,000 farms (National Statistics Institute, 2020), predominantly small and family-operated, facing challenges like productivity growth, farm fragmentation, and water management. Despite these challenges, Spain maintains a positive trade balance in agricultural products, such as olive oil, pork, and wine. Currently, the sector is at a crossroads, aiming to bolster its economic and environmental sustainability through green and digital transitions.

- Fostering a Smart, Resilient, and Diversified Agricultural Sector Ensuring Food Security:** The CAP strategic plan for Spain points to economic resilience despite vulnerabilities due to market volatility. To address low productivity and the high fragmentation of farms, the Commission recommends equitable and environment-centric income support and suggests progress in internal convergence for direct support distribution.
- Bolstering Environmental Care and Climate Action:** Spain's agriculture must intensify efforts to reduce GHG and ammonia emissions, with particular focus on forest management and fire prevention. Water management and the reduction of nitrogen

and phosphorus surplus are critical. Organic farming expansion, biodiversity conservation, and combating desertification are also prioritized.

- **Strengthening the Socio-Economic Fabric of Rural Areas:** Addressing rural depopulation, generational renewal, and social imbalances in rural Spain is essential. The plan urges the protection of agricultural workers, gender equality, and improved animal welfare, especially in the pig sector. It also calls for a significant reduction in pesticides and a push towards healthier sustainable diets.
- **Fostering and Sharing Knowledge, Innovation, and Digitalisation in Agriculture and Rural Areas:** Spain’s AKIS fragmentation and low digital uptake in farms are concerns that require action. Boosting broadband coverage and digital skills in rural areas are vital for the agricultural sector's modernization.
- **Specific Recommendations for the Spanish CAP Strategic Plan:** The Commission's recommendations for Spain encompass improving farm competitiveness, environmental sustainability, climate change mitigation and adaptation, biodiversity enhancement, pesticide reduction, and the promotion of digital transformation in agriculture. It also emphasizes the need for synergies between public and private advisory services and a stronger integration of farmers’ needs in research and innovation projects.

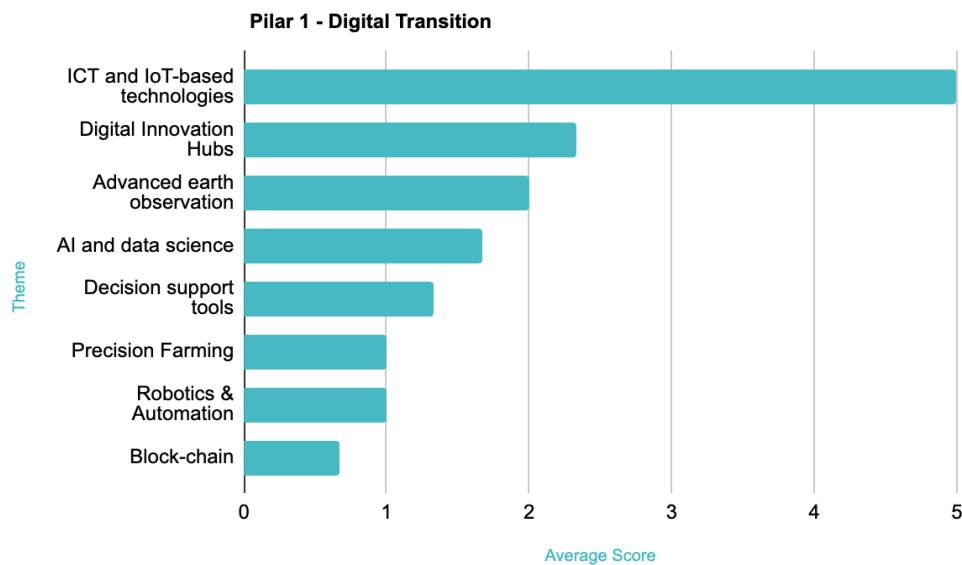
Table 6 - Spain Factsheet: general agrifood characteristics

Country	Population	Rural Population	Number of Farms	Farm Characteristics	Agricultural Economy
Spain	48.447 million	16% (Predominantly Rural Areas)	~915,000	Small, family-operated, diverse outputs	Diverse, positive trade balance, high exports of olive oil, pork, and wine

4.2.2 - AF4F Pillar Analysis

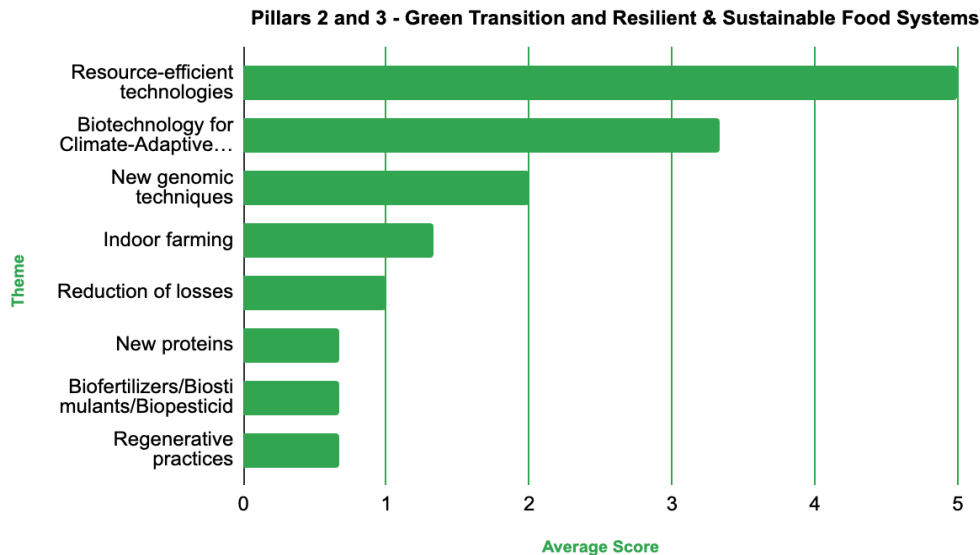
Pillar 1 - Digital Transition: For Spanish respondents, ICT and IoT-based technologies clearly stand out as the top priority, underscoring the critical role of integrating these advanced technologies in agriculture. Digital Innovation Hubs and Advanced Earth Observation for Agricultural Decision-making follow in importance, emphasizing the need for innovative platforms and data-driven approaches in farming. Other areas like AI and data science, Decision support tools, and Precision Farming are also acknowledged.

Figure. 4



Pillars 2 and 3 - Green Transition and Resilient & Sustainable Food Systems: The analysis highlights Resource-efficient technologies as the top priority, emphasizing their crucial role in enhancing sustainability and resilience in food production. Biotechnology for Climate-Adaptive Agriculture also emerged as significantly important, reflecting a strong emphasis on adapting agricultural practices to climate change challenges. Furthermore, New genomic techniques and Indoor farming are recognized as valuable for innovative and efficient agriculture.

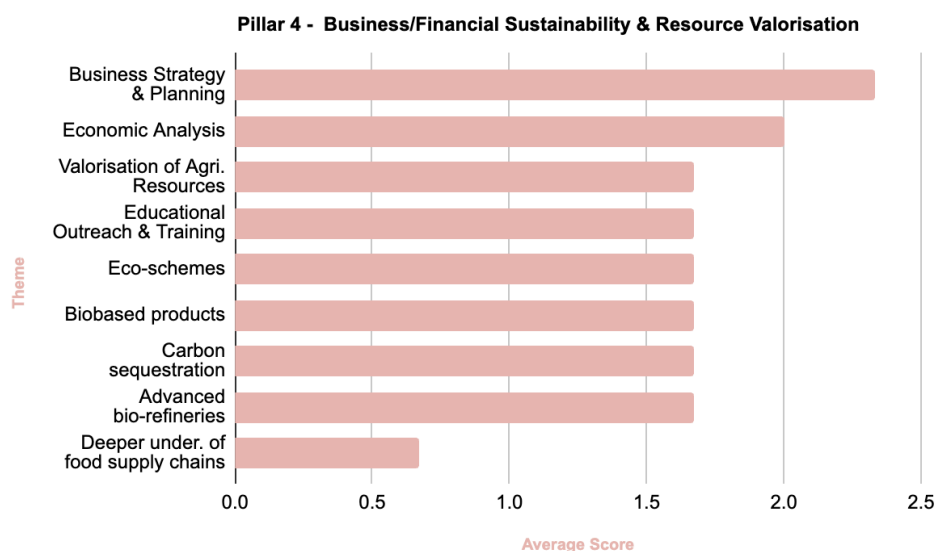
Figure. 5



Pillar 4 - Business/Financial Sustainability & Resource Valorisation: In this pillar, Spanish respondents emphasized the significance of Business Strategy & Planning, underlining its crucial role in enhancing agricultural business stability. Other key areas include Economic

Analysis and Valorisation of Agricultural Resources, and Educational Outreach & Training, reflecting a focus on refining processes, maximizing resource value, and understanding economic trends. Equally important is given to Carbon Sequestration, Bio-based products, Eco-schemes, and Advanced bio-refineries.

Figure. 6



4.2.3 - Case Studies and Best Practices

Table 7 - Recent and Contemporary Innovative Projects by Spanish Entities

Best Practice	AGF4F pillar	Main topics
FlexiGroBots	1 - Digital Transition	ICT IoT Technology, Robotics & Automation, Precision Farming
Guardians	1 - Digital Transition	ICT IoT Technologies, Decision Support Tools, Advanced Earth Observation
Goagrovoltaica	2-3 - Green Transition	Resource-efficient technologies
WalNUT	2-3 - Green Transition	Resource-efficient technologies, Reduction of Losses
Fraction	4 - Business & Resource Valorisation	Advanced Bio-refineries
Novasoil	4 - Business & Resource Valorisation	Business Strategy, Valorisation of Agricultural Resources

The [FlexiGroBots](#) initiative is a [Horizon 2020 Innovation Action](#) geared toward transforming precision agriculture through IoT and intelligent automation. Launched in January 2021, and finalized in December 2023, the consortium, coordinated by ATOS IT SOLUTIONS, developed a platform that orchestrates heterogeneous multi-robot systems. The project includes a series of innovative solutions, from advanced AI-driven analytics to comprehensive data management, aimed at optimizing agricultural operations with precision, more informed decisions, and improved return on investment.

Criteria	Details
Strengths	FlexiGroBots integrates an array of robotics technologies to automate various precision agriculture tasks, offering a versatile solution that enhances farm operational efficiency.
Target Audience	The platform aims to benefit farmers globally, improving the productivity and sustainability of agricultural operations through advanced robotics.
Collaborations	This project represents a collaborative venture, bringing together SMEs, technology experts, and research institutions to innovate in agricultural robotics. The following pilots were successfully conducted: Vineyards in Spain - aiming to boost the quality and economic value of grape production; Rapeseeds in Finland; and Blueberries in Serbia and Lithuania.
Results & Impact	It aims to significantly advance the autonomy and cooperation of robotic systems in agriculture. Early results suggest improvements in crop monitoring and precision in farming operations, leading to reduced environmental impact.
Alignment with AF4F Objectives	The project's development of AI-driven robotic systems for agriculture aligns with AF4F's goals of sustainable and efficient farming, supporting the overall resilience of food systems.

The [GUARDIANS](#) project, running from June 2023 to conclude May 2027, is a forward-thinking European initiative committed to advancing sustainability in small and medium-sized farms. With an [EU contribution](#) of nearly 5 million euros, the project, coordinated by Fundacion CTIC Centro Tecnológico, seeks to empower these guardians of rural territories by deploying innovative digital solutions. GUARDIANS' mission is to narrow the technological divide, promoting the adoption of regenerative and agroecological farming practices through tailored digital innovations.

Criteria	Details
Strengths	GUARDIANS uniquely combines software and hardware innovations like drones and sensors to fulfill the specific needs of small to medium-sized farms, enhancing their productivity and ecological footprint.

Target Audience	The project specifically targets small and medium-sized farm owners across Europe committed to agroecological and regenerative farming practices.
Collaborations	Through an extensive network of cooperatives, tech providers, and innovation experts across multiple EU countries, GUARDIANS' advanced tools and methodologies such as AI-driven analytics, GHG monitoring, and biodiversity assessment services aim to provide tangible improvements in agricultural sustainability and productivity.
Results & Impact	GUARDIANS' pilot projects span across Spain, Italy, Sweden, and Czechia, and are anticipated to foster a substantial increase in the adoption of digital technologies in farming, enhancing the environmental and economic performance of 27 farms, potentially impacting up to 95 farms.
Alignment with AF4F Objectives	The initiative is closely aligned with the EU's Green Deal, contributing directly to the Farm2Fork strategy by bolstering sustainable food production and the Biodiversity Strategy for 2030 by preserving biodiversity within agroecosystems.

The [Agrovoltaica](#), initiated in June 2023, is an innovative project co-funded by the European Agricultural Fund for Rural Development (EAFRD) and the Spanish Ministry of Agriculture, Fisheries, and Food. With a commitment of around 409,000 euros, the project aims to achieve a harmonious synergy between agricultural land use and photovoltaic energy generation, enhancing solar energy efficiency at ground level while ensuring sustainable agricultural practices.

Criteria	Details
Strengths	Agrovoltaica leverages the dual use of land for solar energy production and agriculture, optimizing the efficiency of solar panels while enhancing soil quality and supporting biodiversity.
Target Audience	This initiative targets the agricultural community, especially small and medium-sized farms, aiming to preserve agricultural land use and foster energy-efficient practices within "solar gardens."
Collaborations	This is a collaborative effort between agricultural cooperatives, renewable energy enterprises, and regional associations. It includes pilot installations testing various crops like aromatic plants and legumes grazed by sheep. The agrovoltaic concept aims to reduce water usage, protect crops, and introduce new business models, increasing energy generation and preserving biodiversity.
Results & Impact	Agrovoltaica's pilot installations in Castilla y León, Extremadura, and the Valencian Community aim to demonstrate the feasibility of reducing environmental impacts and combining renewable energy generation with agricultural and livestock uses, leading to economic and social benefits.
Alignment with AF4F Objectives	The project aligns with the Farm2Fork strategy by promoting sustainable food production and the Biodiversity Strategy for 2030 through its commitment to soil health and agroecosystem biodiversity.

[WalNUT](#), launched in September 2021 and running until February 2026, aims to revolutionize nutrient recovery from wastewater and brine. With full funding of nearly 6 million euros from the [EU’s Research and Innovation Action](#), under Horizon 2020, and coordinated by FUNDACION CARTIF in Spain, this initiative aims to design and validate sustainable technological solutions that will recover valuable nutrients for use in bio-based fertilizers and integrate them into a new value chain.

Criteria	Details
Strengths	WalNUT's cutting-edge approach is defined by its integration of advanced physico-chemical, electro-chemical, and biological processes to extract nutrients efficiently. The project seeks to demonstrate these processes' effectiveness through lab-scale validation and the establishment of five innovative pilot plants tailored to achieve high nutrient recovery and minimal environmental impact
Target Audience	Stakeholders include wastewater management entities, agricultural producers, and potentially retailers within the agrifood value chain. They will demonstrate the viability of recovered nutrients as inputs for biofertilizer production.
Collaborations	WalNUT is supported by a consortium of European entities, including research institutes, technology providers, and industrial partners, ensuring a comprehensive and multi-faceted development of the project's objectives.
Results & Impact	WalNUT is poised to advance several key areas, including novel physicochemical treatments for nutrient extraction, electrochemical methods for mineral recovery, and biological processes for nutrient cycling. These technologies are anticipated to catalyze the development of new, sustainable, and commercially viable fertilizers, transforming agricultural practices.
Alignment with AF4F Objectives	WalNUT' is closely aligned with the EU's Green Deal, particularly supporting sustainable agriculture practices and the circular economy. WalNUT aims to reduce the dependency on non-renewable fertilizers and enhance soil health.

[FRACTION](#), running from June 2021 to May 2024, is advancing lignocellulosic biorefinery technology. Funded by the [EU](#) and led by Spain's Agencia Estatal Consejo Superior de Investigaciones Cientificas, it focuses on transforming lignocellulose, a key plant material and biofuel source, using an innovative organosolv fractionation process. It aims to increase biomass efficiency, operate under less harsh conditions, and effectively convert biomass into valuable cellulose, lignin, and hemicellulose.

Criteria	Details
Strengths	FRACTION excels with its innovative organosolv fractionation using gamma valerolactone, an eco-friendly solvent. This method offers efficient biomass processing, operational simplicity, and versatile feedstock usage. It's set to produce high-purity lignin and hemicellulose, enhancing their use in new

	bio-based product value chains.
Target Audience	The project benefits industrial stakeholders in the biofuel and bio-based product sectors, including agri-food, forestry, pulp, and paper industries, particularly those seeking sustainable, cost-effective alternatives to traditional raw materials.
Collaborations	It brings together a robust consortium of EU research bodies, universities, and industrial partners, including Spain, Belgium, Italy, Finland, and the Netherlands.
Results & Impact	FRACTION focuses on scalable technologies to advance biorefineries. Key outcomes are commercially viable sustainable fertilizers and chemicals, reducing the bio-based industry's environmental impact and separation costs. It aims for a 20% economic uplift in lignocellulose processing and a 50% boost in energy efficiency over current methods.
Alignment with AF4F Objectives	FRACTION contributes to establishing new bio-based value chains and developing bio-based products, supporting the EU Green Deal's vision for a climate-neutral, sustainable, and circular economy.

The [NOVASOIL](#) project, initiated in November 2022 with [EU funding](#) of approximately €4.39 million, is coordinated by EVENOR TECH SL in Spain. Focused on soil health, this project is developing a toolbox to enhance sustainable soil management in various climatic conditions and land uses across Europe and beyond. The toolbox will incorporate sustainable practices, certification standards, and innovative business models for soil health.

Criteria	Details
Strengths	NOVASOIL stands out for its comprehensive approach to soil health, integrating sustainable land use practices, innovative product development, and certification standards. This multifaceted strategy aims to elevate soil health's role in agricultural and policy frameworks.
Target Audience	Key stakeholders include farmers, policymakers, and businesses in sustainable agriculture and land management, targeting those committed to integrating soil health into their practices for environmental and agricultural benefits.
Collaborations	Involving diverse EU research institutes, policy bodies, and agricultural sector entities, NOVASOIL's multidisciplinary team is working on 13 case studies.
Results & Impact	The project will develop effective business models, positively impacting policy-making and promoting sustainable soil management practices, aiming to revolutionize soil health integration in agriculture.
Alignment with AF4F Objectives	Aligned with the EU's sustainable agriculture and environmental conservation goals, NOVASOIL actively contributes to sustainable soil management, crucial for food security, biodiversity preservation, and climate change mitigation.

4.3 - France Factsheet

4.3.1 - Overview of France's Agri-food sector

France, with its pivotal role in the EU's agricultural landscape, has undergone significant changes in its agricultural sector. Representing over half of its territory, the country's utilised agricultural area is notable for its diversity, encompassing arable land, permanent grasslands, and permanent crops. With around 390,000 farms in 2020 (source: Agreste, 2023), the sector has observed a decline in the number of farms, notably in livestock operations, alongside an aging workforce, and an increase in hired labor, which corresponds to a decrease in the family-run workforce. As a major exporter, particularly of wine, animal products, and cereals, France's agri-food sector is a crucial contributor to the national economy. Below, is a summary of the Commission's Recommendations for France's CAP Strategic Plan.

- **Fostering a Resilient Agricultural Sector:** In France, addressing income disparities and volatility is pivotal for a resilient agricultural sector. Enhanced risk management strategies and investment in quality and organic production are considered key to increasing farm resilience and competitiveness. The shift towards sustainable food systems poses significant economic opportunities and challenges for French farmers, who experience income volatility due to market fluctuations and extreme climate events. An effective national plan for risk management and targeted support can bolster resilience against these uncertainties.
- **Enhancing Environmental Care and Climate Action:** France faces the challenge of mitigating greenhouse gas emissions, especially from its sizable livestock sector, while simultaneously promoting renewable energy and efficient energy use. Strategies focusing on reducing ammonia emissions, nitrate lixiviation and pesticide leaching (in the framework of the Ecophyto plan) are critical, along with measures to adapt to climate change. This is important as agriculture accounts for nearly 20% of France's total national emissions. The sector also plays a role in energy production from renewable sources, indicating a need for a clear strategy to reduce emissions and pollution.
- **Strengthening Rural Socio-Economic Fabric:** The generation renewal and the support for sustainable forest management are vital for the future of the sector and for maintaining socio-economic health in rural areas where agriculture is a significant activity.
- **Promoting Knowledge, Innovation, and Digitalisation:** Improving France's Agricultural Knowledge and Innovation System (AKIS), expanding broadband coverage, and leveraging technology in agriculture are essential to meet environmental and social challenges. The AKIS in France is strong but could benefit from increased integration.

The improvement of broadband coverage is essential to achieve digital transformation in the agricultural sector.

- **Specific Strategic Recommendations:** Include improving agricultural competitiveness, adopting environmentally friendly practices, reducing pesticide usage, enhancing animal welfare, and promoting healthier diets.

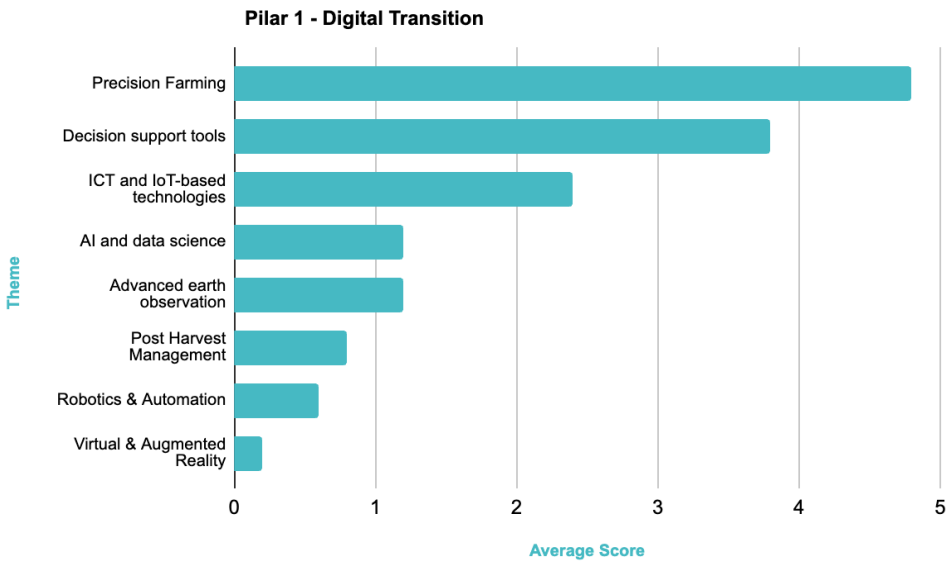
Table 8 - France Factsheet: general agrifood characteristics

Country	Population	Rural Population	Number of Farms	Farm Characteristics	Agricultural Economy
France	Approx. 67 million	Approx. 15-20% live in rural areas	390,000	Average size of 69 ha; diverse agricultural output; strong in cereals, cattle, and wine production	Strategic sector with 3rd largest trade surplus; significant exports in wine, spirits, animal products; facing challenges in competitiveness and farm renewal

4.3.2 - AF4F Pillar Analysis

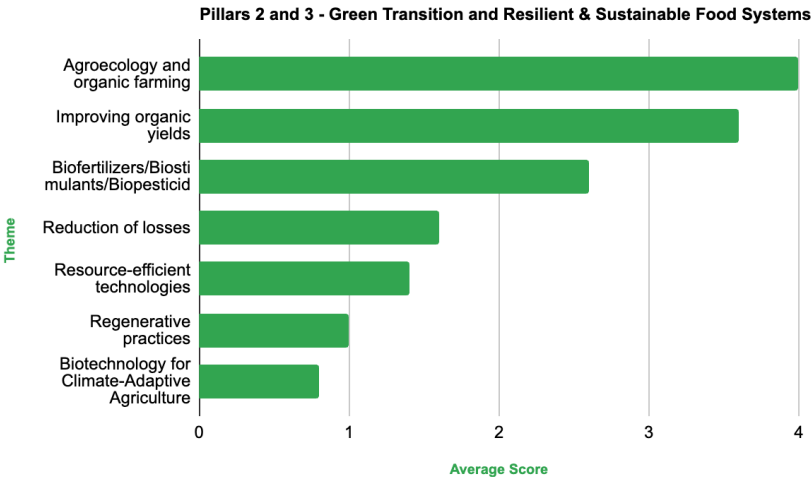
Pillar 1 - Digital Transition: France spotlights Precision Farming as the key to modern agriculture, underscoring the role of Decision Support Tools for informed farm management. ICT & IoT technologies are also prioritized for their real-time data capabilities. While AI and Data Science, alongside Advanced Earth Observation, are acknowledged, their current focus is less pronounced, hinting at their potential future integration for a tech-advanced agricultural landscape.

Figure. 7



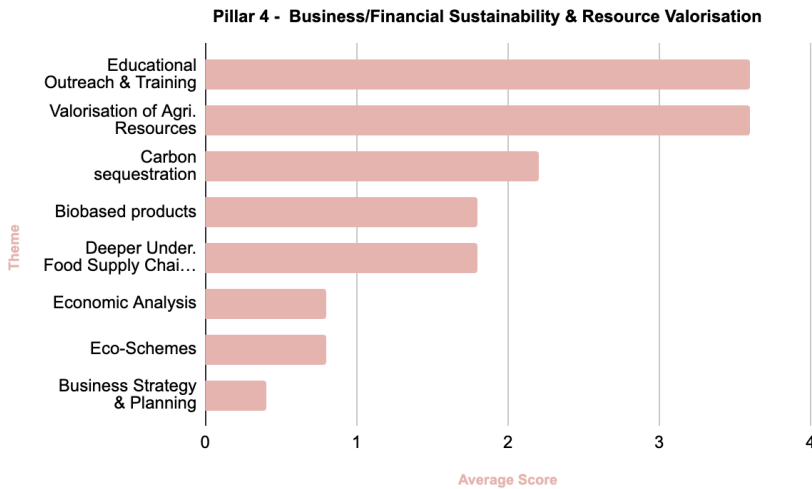
Pillars 2 and 3 - Green Transition and Resilient & Sustainable Food Systems – French respondents emphasize Agroecology and Organic Farming and Improving Organic Yields, highlighting the focus on sustainable and productive organic agriculture. The importance of Biofertilizers/ Biostimulants/ Biopesticides reflects a trend towards eco-friendly farming inputs. Resource-efficient Technologies and Reduction of Losses also rank high, underscoring efforts to enhance agricultural efficiency and sustainability.

Figure. 8



Pillar 4 - Business/Financial Sustainability & Resource Valorisation: French respondents highlight Educational Outreach & Training and Valorisation of Agricultural Resources as the most critical themes. This indicates a strong emphasis on enhancing knowledge and skills in sustainable practices, alongside the efficient use of agricultural resources. Carbon Sequestration and Biobased Products, along with Deeper Understanding of Food Supply Chains, follow closely, reflecting an interest in environmentally friendly practices and sustainable supply chain management.

Figure. 9



4.3.3 - Case Studies and Best Practices

Table 9 - Recent and Contemporary Innovative Projects by French Entities

Best Practice	AGF4F pillar	Main topics
Climate Farm Demo	1 - Digital Transition	Decision Support Tools, ICT and IoT Based Technologies, Advanced Earth Observation
Bee-Move	1 - Digital Transition	Decision Support Tools, Precision Farming
Methane 2030	2-3 - Green Transition	Regenerative practices, Resource-efficient technologies
AE4EU	2-3 - Green Transition	Agroecology and Organic Farming
Leggo	4 - Business & Resource Valorisation	Deeper Understanding of Supply Chains, Valorisation of Agricultural Resources
ECOLACTIPACK	4 - Business & Resource Valorisation	Deeper Understanding of Food Supply Chains, Biobased products, Valorisation of Agrocultural Resources

The [Climate Farm Demo](#) marks a significant stride towards a carbon-neutral Europe. Launched in October 2022 with a [substantial EU investment](#), it's set to run until September 2029, showcasing Europe's commitment to sustainable agriculture. Coordinated by France's Institut de l'Élevage, it is a collaborative endeavor that unites over 80 partners across 27 countries. The project catalyses the transition to Climate Smart Farming (CSF) by hosting thousands of demonstration events and nurturing innovation through Living Labs, aiming to transform agricultural practices and meet the EU's ambitious climate strategy. Another highly relevant project in terms of soil is the "[EJP SOIL](#) – Towards climate-smart sustainable management of agricultural soils", which runs until December 2025 and has an impressive budget of €80M (and an [EU contribution](#) of €40M), distributed by 45 partners.

Criteria	Details
Strengths	Establishes Europe's largest network for climate-resilient farming; showcases practical CSF solutions to reduce agriculture's carbon footprint.
Target Audience	Targets a diverse community of EU farmers, advisors, and policy-makers, aiming to mainstream CSF practices for sustainable agriculture.

Collaborations	A vast consortium with 81 entities, fostering multi-actor engagement to ensure successful CSF adoption and scalability across Europe. It comprises a unique pan-European network of Pilot Demo Farmers covering 28 countries and all pedo-climatic areas.
Results & Impact	Plans 4,500 demo events to increase CSF application, and 10 Living Labs to co-create and disseminate innovative climate-smart practices.
Alignment with AF4F Objectives	Directly contributes to the AF4F vision by integrating CSF across European agriculture, aligning with environmental and digital transition goals.

[METHANE 2030](#) embodies the collaborative spirit and ambition of France's agri-food sector, setting a bold target to cut methane emissions by 30% within a decade. This venture is an integral part of France's "2030 Food Resilience and Capacities" agenda, representing a commitment to sustainability and innovation. The [project](#) is poised to apply a suite of advanced strategies, from genetic selection to herd management and nutritional optimization, showcasing France's advancements in ecological agriculture. The initiative not only aims to propel the nation's cattle farming towards EU's climate objectives, but also to strengthen the sector's resilience and global competitiveness.

Criteria	Details
Strengths	METHANE 2030 targets a significant methane reduction through multi-lever solutions, reflecting France's proactive environmental approach.
Target Audience	The project directly engages French cattle farmers, advisors, and industry stakeholders, encouraging climate-smart farming practices.
Collaborations	Led by Apis-Gene, with INRAE and agricultural chambers, and supported by Valorial's competitiveness cluster, it exemplifies the collaborative synergy in French agriculture.
Results & Impact	Aiming for a 30% reduction in methane from bovine sectors in 10 years, it has implications for employment, with an impact on over 400,000 jobs.
Alignment with AF4F Objectives	With a robust budget and clear targets, METHANE 2030 supports the AF4F vision, contributing to the EU's climate strategy for a sustainable agrifood sector.

[Agroecology for Europe](#) (AE4EU) embodies a transformative approach to European agriculture, integrating science, practices, and a social movement towards sustainable agri-food systems. Coordinated by France's ISARA, [AE4EU](#) is backed by a €2 million EU investment and engages 12 partners across 10 countries. The project aims to fortify Europe's research and innovation framework for agroecology by fostering collaborations, establishing networks of living labs, and aligning with the EU's agroecological and organic farming objectives. Through participatory

workshops, AE4EU aims to reinforcing a food system that upholds environmental stewardship and societal well-being.

Criteria	Details
Strengths	AE4EU champions a holistic agroecological approach, enhancing sustainable farming practices while fostering Europe's agricultural autonomy and resilience.
Target Audience	It engages researchers, farmers, policy-makers, and NGOs across Europe to co-develop and implement agroecological strategies and practices.
Collaborations	The project is a collaboration involving universities, research institutes, and multi-actor organizations, coordinated by ISARA, and includes the European Coordination of La Via Campesina and Agroecologiki. AE4EU will engage with the existing European Network for Agroecological Food systems (ENAF) to enhance and accelerate the adoption of agroecological practices.
Results & Impact	AE4EU will catalyze the transition to sustainable agriculture with a network hub and living labs, influencing policy frameworks and fostering eco-friendly innovation.
Alignment with AF4F Objectives	Aligning with the EU's agroecological principles, AE4EU supports the transition to climate-, ecosystem-, and social-friendly farming systems, contributing to the EU's goal of 25% organic farming land by 2030.

[LEGGO](#) (Légumineuses à Graines Grand Ouest) is a French association formed by four regions (Brittany, Centre-Val de Loire, Pays de la Loire, and Normandy) to reinvigorate the local market for plant-based proteins for human consumption. Founded in May 2020, LEGGO aims to develop a comprehensive legume sector, encompassing peas, fava beans, lupins, lentils, chickpeas, soybeans, and beans, through both commercial and technical support. This initiative highlights France's commitment to enhancing food sovereignty, reducing reliance on imports, and addressing agronomic and environmental concerns.

Criteria	Details
Strengths	LEGGO fosters a regional initiative to develop a robust legume sector, promoting environmental sustainability and food sovereignty in Western France.
Target Audience	Targets the entire value chain from producers, processors, retailers and restaurateurs, focusing on local sourcing and innovative consumption methods, aiming to enhance local legume production.
Collaborations	Unites multiple entities including chambers of agriculture, research institutes, and major players in the food industry to strengthen the legume supply chain.

Results & Impact	Aims to increase legume cultivation to 20,000 hectares, supported by technical assistance and market development, addressing both nutritional and environmental needs.
Alignment with AF4F Objectives	LEGGO aligns with AF4F's goals by encouraging sustainable, local agriculture, promoting plant-based proteins, and enhancing regional food systems.

[ECOLACTIPACK](#), led by France-based [Lactips](#), is a pioneering project financed under the European Innovation Council, with a total cost of €3.42 million and an EU contribution of around €2.39 million. It represents a significant stride in sustainable packaging solutions, aiming to transform paper food packaging with an innovative biodegradable coating based on casein, a milk protein. This groundbreaking material, not only biodegradable in days but also soluble in water, enables the use of recycled paper in food packaging without the environmental impact of traditional plastic coatings. ECOLACTIPACK's vision aligns with the EU's broader environmental goals, offering a fully recyclable, compostable solution that can degrade harmlessly in marine environments, thereby addressing a critical source of pollution in urban and coastal areas.

Criteria	Details
Strengths	ECOLACTIPACK leverages casein-based biodegradable materials to revolutionize food packaging, balancing functionality with environmental responsibility.
Target Audience	It addresses the needs of the food packaging industry, particularly sectors heavily reliant on take-away and disposable packaging.
Collaborations	Spearheaded by Lactips , the project combines expertise from various sectors, including material science, environmental research, and packaging technology.
Results & Impact	The project aims to replace conventional plastics in paper packaging, significantly reducing plastic waste and its ecological footprint.
Alignment with AF4F Objectives	ECOLACTIPACK supports sustainable packaging innovations, aligning with AF4F's focus on reducing environmental impact and promoting eco-friendly solutions in food systems.

[BEE-MOVE](#), coordinated by France's Centre National de la Recherche Scientifique (CNRS), is an innovative project funded under the European Research Council. With a total budget of €1.99 million, the project aims to explore the foraging patterns and pollination strategies of bees, a crucial aspect of both ecological and economic significance. Utilizing a novel radar system, BEE-MOVE will record and analyze the individual movements of hundreds of bees in their natural habitats. This [interdisciplinary approach](#), blending pollinator behavior with plant ecology, will deepen our understanding of pollinator movements and their impact on pollination efficiency.

Criteria	Details
Strengths	BEE-MOVE offers groundbreaking insights into bee foraging and pollination through advanced radar technology, enhancing our understanding of these crucial ecological agents.
Target Audience	This project is vital for ecologists, economists, conservationists, and agricultural professionals, providing valuable data for sustainable practices and policy-making.
Collaborations	Spearheaded by CNRS, BEE-MOVE involves an interdisciplinary team including bee biologists, radar scientists, computer scientists, and plant ecologists.
Results & Impact	The insights gained from BEE-MOVE will be instrumental in designing practical conservation strategies and enhancing sustainable agriculture, contributing to global efforts to address the decline in pollinator populations.
Alignment with AF4F Objectives	BEE-MOVE aligns perfectly with the AF4F's focus on sustainable agriculture and biodiversity conservation, addressing the critical issue of pollinator decline and its impact on food systems.

4.4 - Belgium Factsheet

4.4.1 - Overview of Belgium's Agri-food sector

The agri-food sector in Belgium is recognized for its high-quality produce and significant contribution to both the national economy and the European market. With distinct agricultural characteristics in Flanders and Wallonia, the sector navigates the dual challenge of transitioning towards green and digital innovations. This is crucial for enhancing economic resilience, promoting environmental sustainability, and addressing specific regional challenges such as farm income disparities, high land prices, and the need for advanced risk management tools.

- Fostering a Smart, Resilient, and Diversified Agricultural Sector Ensuring Food Security:** Belgium's CAP strategic plan underscores the necessity of a robust agri-food sector capable of adapting to economic fluctuations. The Commission points to the varying income levels across farm sizes, sectors, and regions, suggesting a focus on equitable income support and the adoption of risk management instruments to stabilize incomes. Income increases with farm size due to more efficient use of technology and economies of scale. For small and medium-sized farms' the price of arable land and feed greatly impacts competitiveness.
- Bolstering Environmental Care and Climate Action:** The agricultural sector's high livestock density and intensive fertilizer use require a strengthened commitment to reducing GHG emissions and nutrient surpluses. The Commission highlights the need for efficient forest management, water conservation, and peatland preservation as

carbon sequestration tools. They also highlight reducing non-CO₂-emissions from the livestock sector and soil fertilisation and maintaining and improving the carbon storage capacity by supporting the maintenance of grassland and conservation/zero tillage via carbon farming approaches. In addition, the Commission highlights that arable land is particularly suited to improving climate change mitigation because the methods adopted can be changed annually over large areas. For example, Belgium could promote on-farm carbon assessment tools to help farmers identify the most appropriate measures to improve their climate performance. It also emphasizes the importance of expanding organic farming, particularly in Flanders, to foster biodiversity and combat habitat degradation.

- Strengthening the Socio-Economic Fabric of Rural Areas:** Rural depopulation and the aging farmer demographic pose significant challenges. The CAP plan calls for improving access to land, particularly for young and female farmers, and capitalizing on the potential of bio-based products and tourism to create jobs. The Commission also stresses the importance of reducing antimicrobials and pesticide usage, transitioning towards healthier diets, and ensuring animal welfare, in the pig and dairy sector.
- Fostering and Sharing Knowledge, Innovation, and Digitalisation in Agriculture and Rural Areas:** Knowledge and innovation play a crucial role in assisting farmers and rural communities in addressing present and future challenges. An effective Agricultural Knowledge and Innovation System (AKIS) should provide ample information to meet the growing needs of farmers, accelerate innovation, and enhance the value of existing knowledge, all aligned with the objectives of the Common Agricultural Policy (CAP). While the Belgian AKIS is considered strong, further integration in Wallonia and improvement in the full participation of producers in innovative projects are essential. Additionally, investing in training and skills is crucial.

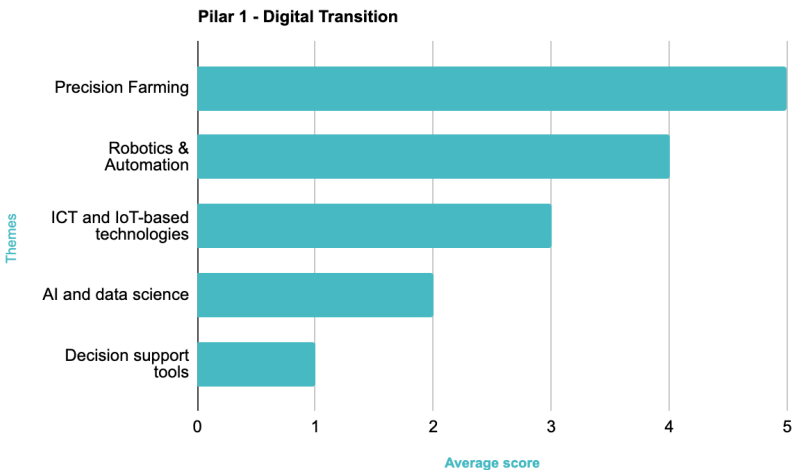
Table 10 - Begium Factsheet: general agrifood characteristics

Region	Population	Rural Population	Number of Farms	Farm Characteristics	Agricultural Economy
Flanders	Approx. 6.589 million	Data not explicitly provided	Approx. 23,000	Average size of 27 ha; mainly family-operated; 90% specialization; diverse outputs	Employs around 46,000 people; focuses on sustainability and modernization
Wallonia	Approx. 3.644 million	26.6% live in rural areas	Approx. 12,000	Strong in livestock farming, meat and dairy; followed by crops	Focus on sustainability and modernization; income challenges; significant livestock presence

4.4.2 - AF4F Pillar Analysis

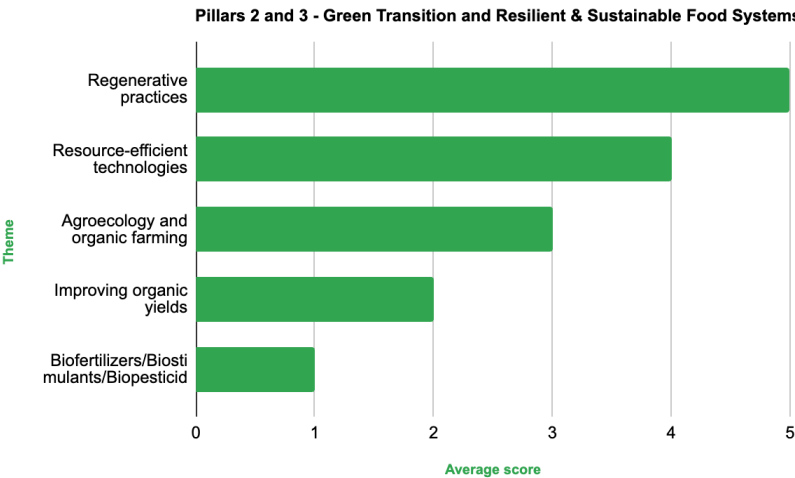
Pillar 1 - Digital Transition - For Belgium, Precision Farming takes precedence, spotlighting the push for advanced, efficient agriculture. Following closely are Robotics & Automation and ICT and IoT-based technologies, underscoring the drive towards technologically enhanced farming. AI and Data Science and Decision Support Tools round out the priorities, supporting data-led agricultural insights.

Figure. 10



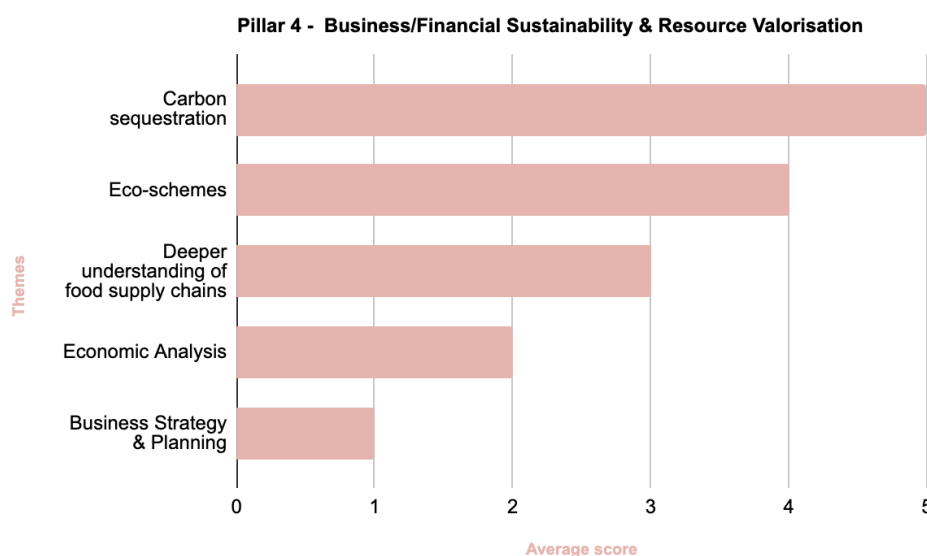
Pillars 2 and 3 - Green Transition and Resilient & Sustainable Food Systems - For Belgium, 'Regenerative Practices' take the lead, stressing a commitment to sustainable, soil-enriching agriculture. Resource-efficient Technologies follow, emphasizing the need for sustainable resource use. Agroecology and Organic Farming underscore the move towards eco-friendly farming practices.

Figure. 11



Pillar 4 - Business/Financial Sustainability & Resource Valorisation - Belgium focuses on Carbon Sequestration, valuing environmental impact mitigation in agriculture. Eco-schemes and supply chain analysis follow, indicating investment in sustainability and market intelligence. 'Economic Analysis' and 'Business Strategy' complete the picture, aligning financial insight with environmental strategy.

Figure. 12



4.4.3 - Case Studies and Best Practices

Table 10 - Recent and Contemporary Innovative Projects by Belgium Entities

Best Practice	AGF4F pillar	Main topics
Flax 2.0	1 - Digital Transition	Precision Farming, ICT IoT Technology
ScaleAgData	1 - Digital Transition	ICT IoT Technologies, Decision Support Tools, Advanced Earth Observation
MARVIC	2-3 - Green Transition	Carbon sequestration, Reduction of Losses
ClimateSmartAdvisors	2-3 - Green Transition	Regenerative Practices, Resource-efficient technologies
FoodDataQuest	4 - Business & Resource Valorisation	Food Supply Chains, Economic Analysis, Business Strategy
TITAN	4 - Business & Resource Valorisation	Business Strategy, Valorisation of Agricultural Resources

The [Flaxsense 2.0 project](#) represents a significant leap forward for the flax industry, implementing precision agriculture techniques to enhance the efficiency and effectiveness of flax cultivation. This ongoing initiative is a [collaboration](#) between Inagro, ILVO, and VITO, aiming to develop a digital visual monitoring tool that will enable flax growers to monitor their crops remotely. By utilizing satellite imagery, the project aspires to provide actionable insights for optimal sowing times, potential resowing, and uniform crop growth through the use of growth inhibitors.

Criteria	Details
Strengths	Flaxsense 2.0 introduces advanced remote monitoring capabilities to flax cultivation, utilizing satellite imagery to enhance decision-making and improve crop management. The integration of a flax growth model will facilitate predictive analytics for better cultivation strategies.
Target Audience	The project primarily serves flax growers across Belgium, Northern France, and the Netherlands, regions known for extensive flax cultivation. It provides a valuable tool for farmers to monitor widespread plots, optimizing crop management with up-to-date, objective data.
Collaborations	Flaxsense 2.0 is a synergistic effort between research bodies and the flax sector, leveraging expertise from Inagro's agronomic knowledge, ILVO's crop modeling, and VITO's remote sensing capabilities. The project is further supported by the General Belgian Flax Association, advocating for innovative, data-driven flax farming.
Results & Impact	Flaxsense 2.0 is a synergistic effort between research bodies and the flax sector, leveraging expertise from Inagro's agronomic knowledge, ILVO's crop modeling, and VITO's remote sensing capabilities. The project is further supported by the General Belgian Flax Association, advocating for innovative, data-driven flax farming.
Alignment with AF4F Objectives	Flaxsense 2.0 aligns with AF4F's objectives by promoting sustainable agricultural practices, improving the use of resources, and incorporating digital tools to enhance the agronomic and environmental performance of the flax sector. The initiative contributes to a more resilient and innovative agricultural ecosystem.

The [ScaleAgData](#) project, led by VITO, embarks on a transformative journey to redefine agricultural data management throughout Europe. With a [Research and Innovation Action](#) (H2020) budget of €7.496 million and a timeline extending from January 2023 to December 2026, the initiative is set to streamline agri-environmental monitoring by integrating data from farm-based sensors with satellite imagery. ScaleAgData is poised to address the local-level data gaps in agri-environmental monitoring.

Criteria	Details
Strengths	ScaleAgData harnesses the power of advanced sensor technology, edge computing, and Earth observation products to enable comprehensive monitoring and optimization of agri-environmental conditions. It represents a significant step toward closing the technological gap in this sector, allowing access to real-time data.
Target Audience	The project benefits a broad audience including small-scale, agroecological farmers, managers, and policymakers across Europe. ScaleAgData empowers stakeholders to make informed decisions that drive agricultural competitiveness and sustainability.
Collaborations	The consortium embodies a diverse network of 26 partners from 14 countries, including research institutes, technology SMEs, machinery producers, Earth Observation service providers, and agri-food organizations, ensuring a multifaceted approach to addressing Europe's agricultural challenges and harnessing its opportunities.
Results & Impact	The project's Research and Innovation Labs are set to drive innovation, covering a wide range of environmental dimensions and biogeographical zones in Europe. ScaleAgData's integrated data approach promises to deliver improved monitoring capabilities, which are crucial for sustainable agricultural production.
Alignment with AF4F Objectives	By enhancing data governance and advancing sensor technology, the project supports the overarching goals of improving the efficiency and environmental footprint of farming practices, thereby strengthening the resilience of Europe's food systems.

The [MARVIC](#) project, coordinated by Belgium's ILVO, is geared towards contributing to the EU's climate neutrality ambitions by refining monitoring systems for soil carbon and greenhouse gas balances in agriculture. With a [Horizon Europe](#) funding of €7 million, the project runs from June 2023 to May 2027, focusing on developing a harmonized framework for Monitoring, Reporting, and Verification (MRV) of agricultural activities.

Criteria	Details
Strengths	MARVIC represents a pioneering effort to address the critical need for carbon removal in the agricultural sector. It aims to develop practical MRV systems for GHG reporting and to support payment systems that incentivize land managers for carbon reduction efforts. This approach could significantly boost environmental sustainability and offer economic incentives for adopting greener practices in agriculture.
Target Audience	The project caters to a broad audience, including land managers, policy makers, and environmental agencies, ensuring that stakeholders at every level can access verified emission and removal data, a cornerstone for the proliferation of carbon farming.

Collaborations	MARVIC exemplifies a coordinated joint effort, assembling a consortium of 26 diverse partners from 14 countries. The collaboration includes research institutes, technology SMEs, and universities, collectively striving to establish a standardized MRV system framework that efficiently navigates the trade-offs between cost, accuracy, and administrative demands.
Results & Impact	The project's outcomes are expected to deliver tangible benefits in terms of improved carbon accounting, enhancing the sustainability of agricultural practices, and contributing to climate neutrality goals. MARVIC intends to boost the EU's capacity for verified carbon sequestration and data-informed policy-making.
Alignment with AF4F Objectives	MARVIC's alignment with the EU's Green Deal and Soil Mission is unequivocal, as it strives to deliver high-fidelity data for carbon sequestration, propelling Europe towards a sustainable and data-driven agricultural future.

[ClimateSmartAdvisors](#), coordinated by ILVO, focuses on advancing climate-smart farming practices across the EU. Funded with a robust [Horizon Europe grant](#) of €18.28 million, the project runs from April 2023 to March 2030. It aims to enhance the advisory capabilities in sustainable agriculture, thereby accelerating the uptake of eco-friendly practices among the farming community.

Criteria	Details
Strengths	ClimateSmartAdvisors leverages a network of advisory communities of practice (CoP) and expert training to develop a robust advisory framework. This framework supports the dissemination of climate-smart innovations and practices, enhancing the resilience and sustainability of EU agriculture.
Target Audience	The primary audience includes agricultural advisors, farmers, and other stakeholders in the EU agricultural sector. The project aims to provide these groups with tools, knowledge, and practices for climate-smart farming, thereby empowering them to make informed decisions towards sustainable agriculture.
Collaborations	This project represents a wide-ranging collaboration among 27 countries, involving research institutions, agricultural advisory services, and policy-makers. It focuses on fostering a unified approach to climate-smart agriculture, facilitating cross-border knowledge sharing and practice development.
Results & Impact	Expected outcomes include enhanced climate-smart advisory services, the establishment of an EU-wide network of 260 advisory CoPs, and the development of 1,500 advisors. These results aim to facilitate a broader adoption of climate-smart practices in EU agriculture, contributing to environmental sustainability and improved farming resilience.
Alignment with AF4F Objectives	ClimateSmartAdvisors aligns with the European Green Deal's objectives by promoting sustainable agricultural practices. It focuses on upskilling advisors and developing climate-smart practices, contributing directly to the EU's ambitions for a more sustainable, resilient, and competitive agricultural sector.

[FoodDataQuest](#), coordinated by [ILVO](#), is a nascent project set to run from February 2024 to July 2027. Funded with €4 million by the EU, it stands at the forefront of data-driven transformations in the agri-food industry. As it unfolds parallel to the AF4F program, FoodDataQuest is integral to advancing sustainable and inclusive food systems. It aims to harness diverse data sources and cutting-edge AI and ML technologies, providing pivotal insights into creating healthier, more sustainable food systems.

Criteria	Details
Strengths	FoodDataQuest introduces significant innovation by integrating diverse data sources across the agri-food sector. By leveraging advanced data-driven solutions, the project aims to effectively reduce waste and promote ethical practices, marking a practical step forward in transforming the agri-food industry.
Target Audience	The project primarily targets stakeholders within the agri-food sector, including farmers, policymakers, food industry players, and consumers. It aims to empower them with actionable insights to operate sustainably and inclusively, addressing the critical challenges of modern agriculture.
Collaborations	FoodDataQuest involves 14 partners, including research institutions, industry players, and policymakers across Europe. This diverse consortium aims to foster a holistic approach to sustainable food system transformation.
Results & Impact	Anticipated outcomes include the development of AI and Machine Learning-based tools and guidelines that will facilitate data-driven decisions in the agri-food sector. These tools are expected to promote sustainable practices, transparency, and efficiency in food production and distribution.
Alignment with AF4F Objectives	FoodDataQuest's mission aligns closely with the objectives of the AF4F initiative and the European Green Deal. By focusing on data-driven innovations in the agri-food sector, it aims to contribute significantly to the development of sustainable, healthy, and inclusive food systems.

[TITAN](#), coordinated by the International Life Sciences Institute European Branch in Belgium, embarks on an innovative journey to transform the European food system. With a budget exceeding 11 million euros (of which 9.6M from a Horizon Europe Research and Innovation Action grant), TITAN engages 28 partners from 14 countries. The project intertwines advanced technologies such as Blockchain, AI, and IoT to address food safety, traceability, health, and sustainability, setting a new standard for the agri-food industry's transparency.

Criteria	Details
Strengths	TITAN stands out with its innovative approach, leveraging a mix of cutting-edge technologies to enhance transparency in the agri-food sector. The project focuses on critical areas like food safety, authenticity, traceability, health, and sustainability. It also includes a €1.25M open call, designed to encourage innovation within the European Green Deal strategy, particularly targeting SMEs and start-ups.

Target Audience	The project primarily targets a broad range of stakeholders within the agri-food sector, with a special emphasis on SMEs and start-ups. Consumers seeking greater transparency in their food choices and policymakers interested in fostering sustainable, healthy, and accessible food options also form a crucial part of the target audience.
Collaborations	The TITAN project is a collaborative venture involving 28 partners across 14 countries, including universities, research institutes, SMEs, and non-profit organizations. This diverse consortium unites technology providers, research centers, and agri-food stakeholders.
Results & Impact	The project is expected to positively impact the agri-food sector by leading to safer, healthier, and more sustainable food choices, contributing to societal and environmental well-being. It aims to shape a demand-driven economy and enhance food system transparency.
Alignment with AF4F Objectives	Aligned with the EU's Green Deal and the Farm to Fork Strategy, TITAN's mission is to catalyze a transformation in the food system, making it more transparent, sustainable, and health-conscious.

4.5 - Italy Factsheet

4.5.1 - Overview of Italy's Agri-food sector

Italy's agri-food sector, deeply rooted in a rich mosaic of traditional farming and culinary heritage, is actively embracing the dual green and digital transition. Amidst challenges like fragmented farm structures and labor exploitation, Italy is steering towards sustainable practices and digital innovations to enhance agricultural productivity and environmental care. This transition is key to maintaining Italy's position as a global leader in quality agricultural produce, particularly in wine production, while ensuring the vitality and socio-economic resilience of its rural communities.

- Fostering a Smart, Resilient, and Diversified Agricultural Sector Ensuring Food Security:** The EC acknowledges the economic opportunities and challenges for Italian farmers in transitioning to a sustainable food system. It notes Italy's struggles with low productivity growth due to factors like an aging farm population and small farm sizes. The recommendation is to make income support more equitable and environmentally oriented.
- Bolstering Environmental Care and Climate Action:** This section highlights the need for Italy to take significant steps in reducing agricultural emissions, which have not decreased notably in recent years. The recommendations focus on sustainable management practices, particularly in the livestock sector, renewable energy production, and climate change adaptation. A strong emphasis is placed on improving water management and addressing nitrates pollution.

- **Strengthening the Socio-Economic Fabric of Rural Areas:** The document points to the need for generational renewal in agriculture and addressing the rural exodus. This includes focusing on social challenges, like the protection of agricultural workers and promoting sustainable food systems that align with consumer preferences for quality and organic production.
- **Fostering and Sharing Knowledge, Innovation, and Digitalisation in Agriculture and Rural Areas:** Here, the emphasis is on addressing the fragmentation in the Agricultural Knowledge and Innovation System (AKIS) and improving the flow of knowledge and innovation. Enhancing digitalisation in farms and rural areas is seen as a critical step towards a more sustainable and competitive agricultural sector.
- **Specific Recommendations for the Italian CAP Strategic Plan:** The recommendations focus on a wide range of issues including improving the competitive position of agriculture, enhancing sustainability, mitigating climate change, fostering climate change adaptation, halting biodiversity loss, reducing pesticide use, improving animal welfare, and encouraging the involvement of young people in farming. The document also stresses the importance of strengthening digital infrastructure and skills in rural areas.

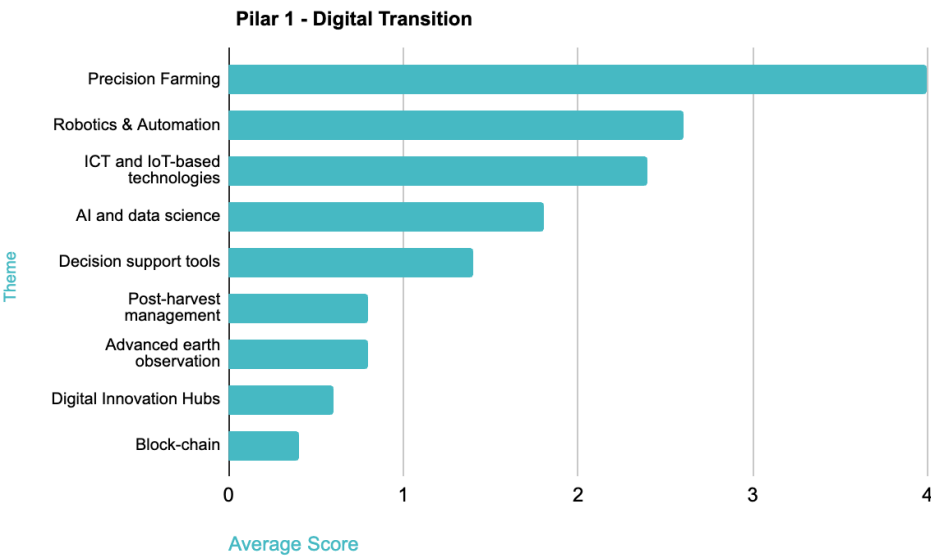
Table 11 - Italy Factsheet: general agrifood characteristics

Country	Population	Rural Population	Number of Farms	Farm Characteristics	Agricultural Economy
Italy	60.35 million	53% (Rural/Intermediate Areas)	1.1 million	Small, family-operated, diverse output, major wine producer	Fragmented structure, quality agricultural goods, negative effects due to lack of infrastructure

4.5.2 - AF4F Pillar Analysis

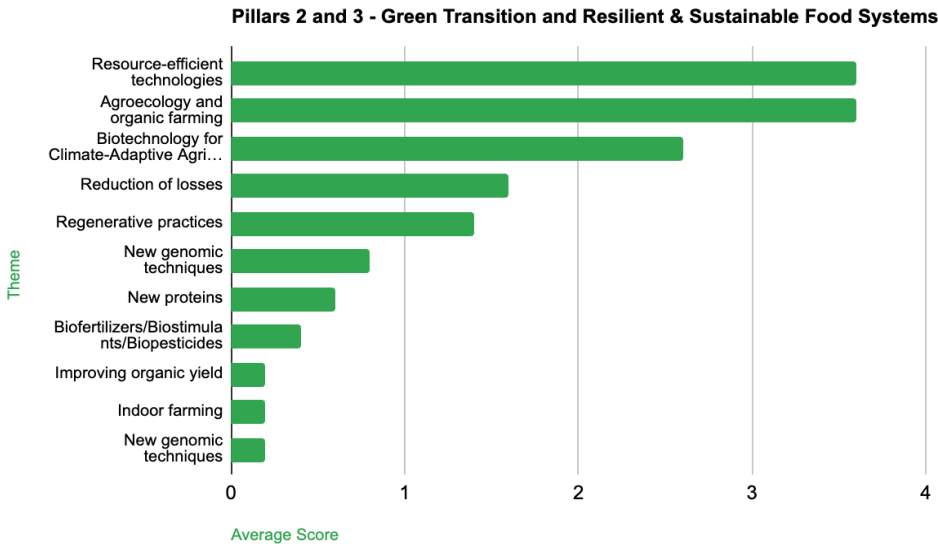
Pillar 1 - Digital Transition: Italian respondents underscored Precision Farming as the most critical theme. Robotics & Automation and ICT & IoT-based technologies also received considerable importance, showcasing a tendency towards the adoption of smart and interconnected systems in agriculture. AI and Data Science were acknowledged as well, indicating an inclination to leverage data-driven insights for agricultural innovation.

Figure. 13



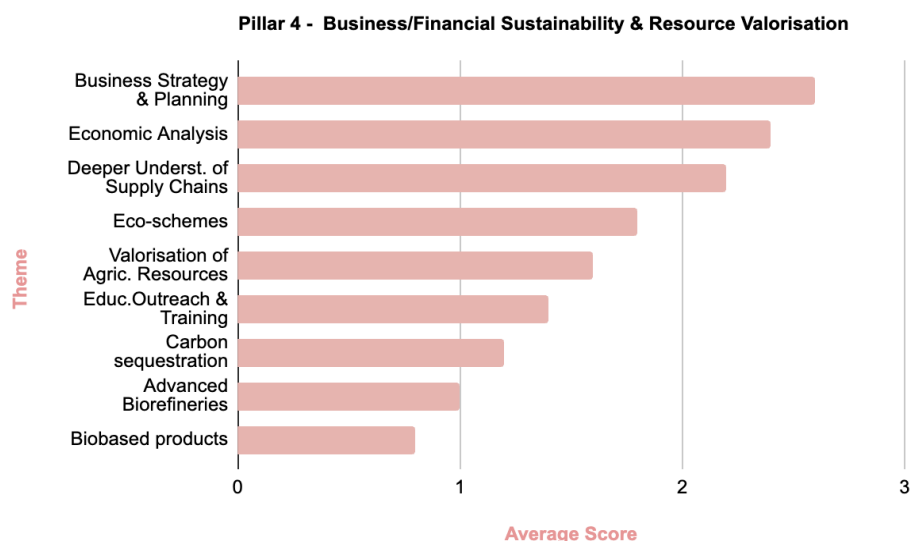
Pillars 2 and 3 - Green Transition and Resilient & Sustainable Food Systems - Both agroecology and organic farming, alongside resource-efficient technologies, have been identified as key priorities, signaling a strong inclination towards sustainable practices and efficient resource use in agriculture. Biotechnology for Climate-Adaptive Agriculture also stands out, underscoring the importance of innovation in addressing climate-related challenges, followed by Reducing of losses and Regenerative practices.

Figure. 14



Pillar 4 - Business/Financial Sustainability & Resource Valorisation - The focus on Business Strategy & Planning and Economic Analysis highlights their crucial role in sustainable business practices. Additionally, understanding food supply chains and valuing agricultural resources are key, indicating a comprehensive approach to sustainable business development.

Figure. 15



4.5.3 - Case Studies and Best Practices

Table 12 - Recent and Contemporary Innovative Projects by Italian Entities

Best Practice	AGF4F pillar	Main topics
RIGA-AT Project	1 - Digital Transition	Robotics and Automation, AI and Data Science
LANDSUPPORT	1 - Digital Transition	ICT IoT Technologies, Decision Support Tools, Advanced Earth Observation
Prima in Sostenibilità	2-3 - Green Transition	Agroecology, Resource-efficient technologies
BRESOV	2-3 - Green Transition	Organic farming
VIVA Program	4 - Business & Resource Valorisation	Business Strategy, Deeper Understanding of Supply Chains
LCA Project	4 - Business & Resource Valorisation	Business / Economic Analysis

The [RIGA-AT Project](#), led by the Regio-Emilia based [SME Redox](#), an innovative SME based in Reggio Emilia, aims to develop an easy-to-use guidance system for outdoor industrial robots. This system uses advanced technology to ensure robots can navigate with great accuracy, making them ideal for a variety of outdoor tasks. Redox collaborates with partners including the University of Ferrara, MechLav, and the DAL Laboratory at the University of Modena and Reggio Emilia, supported by European funds from the Emilia-Romagna Region. This initiative not only showcases the potential of AI and robotics in enhancing industrial efficiency outdoors but also highlights the collaborative effort across leading academic and research institutions to push the boundaries of technology.

Criteria	Details
Strengths	RIGA-AT leverages a user-friendly guidance system equipped with AI-driven microprocessors, setting a new standard for precision in outdoor industrial robotics. Its innovative use of technology ensures accurate navigation over extensive areas, supported by LORA connectivity for operations spanning up to 20km.
Target Audience	RIGA-AT serves farmers and agribusinesses seeking precise, versatile robotic solutions for both indoor and outdoor agricultural environments, where current options are inadequate.
Collaborations	Facilitated by European Regional Development Fund contributions, the project unites Redox with academic and research partners like MechLav - Lab of Technopole of Ferrara/University of Ferrara, and the Digital Automation Lab at the University of Modena and Reggio Emilia, bringing together leading expertise in mechatronics and digital automation.
Results & Impact	RIGA-AT's electronic kit is a game-changer, converting vehicles into smart, autonomous robots capable of enhancing precision agriculture. Its applications in intelligent pesticide application, water resource management, and crop surveillance underscore a significant leap toward sustainable and efficient farming practices.
Alignment with AF4F Objectives	Perfectly in sync with the AF4F, RIGA-AT marries the strengths of precision farming, robotics, and ICT. It champions the transformation towards an automated, resilient agricultural sector.

The [LANDSUPPORT](#) project, led by the University of Naples Federico II and funded under the [EU Horizon 2020 program](#), marks a key step in sustainable land and agricultural management. It surpasses the limitations of traditional web GIS and DSS (Decision Support Systems) tools, which are often restricted in scope and adaptability. By incorporating advanced geospatial data, LANDSUPPORT offers versatile, multi-scale solutions suitable for various disciplines. It engages directly with users like farmers and policymakers, fostering tools that are both adaptable and user-friendly, catering to diverse land management requirements.

Criteria	Details
Strengths	Innovative integration of advanced geospatial data in web GIS and DSS tools, overcoming traditional limitations by offering adaptable, interdisciplinary, and user-friendly solutions.
Target Audience	European stakeholders, including farmers, policymakers, urban planners, and environmental experts, with a special focus on Italian agricultural stakeholders.
Collaborations	Broad European consortium involving academic institutions, government bodies, and the technology sector, employing a 'living lab' approach for inclusive tool development.
Results & Impact	Enhanced decision-making in land resource management and sustainable practices; increased user adoption due to participatory development; significant contribution to sustainable agriculture in Italy and Europe.
Alignment with AF4F Objectives	Aligns with AF4F goals by promoting technology-driven sustainable practices in agriculture and land management, emphasizing user engagement and practical application.

[Prima in Sostenibilità](#) (First in Sustainability) led by Selenella, is an innovative Bologna-based project focused on sustainable potato farming. It emphasizes reducing chemical use, fostering biodiversity, and efficient water management, effectively lowering the carbon footprint of potato production. This initiative not only promotes sustainable practices among farmers and consumers but also highlights the essential role of traceability and transparency in the production chain. Selenella comprises 10 members and represents around 320 producers, handling 60,000 tons of potatoes, and, according to Nielsen data, holding a 19.4% market share by value as of April 2017.

Criteria	Details
Strengths	Emphasis on sustainable farming practices, including a reduction in chemical use, fostering biodiversity, and efficient water management. Carbon footprint reduction in potato production.
Target Audience	Engaging farmers, agri-business stakeholders, and consumers in sustainable practices, and educating them about the environmental impact of food choices.
Collaborations	Involves collaborations with farmers, supply chain participants, and environmental experts to implement and promote sustainable agriculture.
Results & Impact	Notable reduction in environmental impact, leading the packaged potato market in Italy, and raising consumer awareness about sustainable agriculture.
Alignment with AF4F Objectives	Demonstrates practical applications of sustainable agriculture, serving as a model for environmental sustainability in the agri-food sector, and aligns with AF4F's goals of sustainable and resilient food systems.

The [BRESOV](#) project, coordinated by the University of Catania, Italy, focuses on enhancing organic vegetable production. Its objective is to develop climate-resilient cultivars for organic systems, addressing the challenges of climate change. BRESOV works on key crops like broccoli, green bean, and tomato, aiming to improve their adaptation to organic farming conditions. This [EU-funded initiative](#) emphasizes genetic diversity, employing advanced breeding techniques to enhance crop resilience and quality. With a consortium of 22 partners, BRESOV's outcomes are expected to significantly influence organic farming practices in the EU and beyond, contributing to food security and sustainable agriculture.

Criteria	Details
Strengths	BRESOV advances climate-resilient cultivars for organic farming by harnessing genetic diversity for improved soil interaction and stress resilience. It combines innovative breeding with sustainable methods, emphasizing ecological crop enhancement.
Target Audience	The primary beneficiaries are organic farmers, seed industries, and stakeholders in the organic vegetable production sector across Europe and beyond. Its findings are particularly valuable for regions facing significant climate challenges.
Collaborations	Spearheaded by Italy's University of Catania, BRESOV is a collaborative effort involving 22 partners from nine EU Member States and countries like China, South Korea, Switzerland, and Tunisia. The project fosters a multi-actor approach, engaging with various organic farming stakeholders, including research institutes and breeding companies.
Results & Impact	BRESOV has achieved notable success in breeding resilient and efficient crop lines for broccoli, snap bean, and tomato, tailored for organic farming. The project has contributed to increased yield, enhanced nutritional and organoleptic qualities of crops, and improved organic seed production techniques.
Alignment with AF4F Objectives	By developing climate-adaptive cultivars and enhancing organic farming practices, the project comprehensively contributes to addressing broader food security and sustainability challenges, in the context of organic farming.

The [VIVA Program](#), viticoltura sostenibile, initiated in 2011 by Italy's Ministry of the Environment and Energy Security, and OPERA – Research Center for Sustainable Development in Agriculture of Università Cattolica del Sacro Cuore, plays a key role in fostering an environmentally respectful and territory-enhancing production model within the Italian wine sector. Focused on sustainable production, with four indicators that provide companies with the possibility of having a diagnosis of their sustainability performance, it is crucial for maintaining the quality of Italian wines and bolstering international market presence. Its growing adoption underscores its importance in steering the industry toward sustainable practices. According to “The wine business in Italy: consumption, trends and growth prospects” (Rome Business School), the sector is valued at over \$10 billion, representing 17% of the world's wine production and leading in global exports with 21.9 million hectoliters in 2022.

Criteria	Details
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Strengths	VIVA promotes sustainable viticulture practices, focusing on environmental respect and territory enhancement. It supports quality and market competitiveness of Italian wines.
Target Audience	Wine producers, consumers, and stakeholders in the Italian wine sector.
Collaborations	Ministry of the Environment and Energy Security, various stakeholders in the wine industry, environmental experts.
Results & Impact	Participation of 173 farms (incl. 15 cooperatives), covering 50,178 hectares of vineyards. VIVA-certified companies produced 307,744,928 liters of wine, with over 5,068,461 bottles bearing VIVA product certification. > 350 professionals trained in VIVA Courses for sustainability operators in the wine sector.
Alignment with AF4F Objectives	Aligns with AF4F's focus on sustainable and resilient food systems by promoting environmentally sustainable practices in a significant economic sector.

The Life-Cycle Assessment Development for Sustainable Bottling Systems, the [LCA project](#), spearheaded by [GEA Procomac \(Filling and Packaging\)](#) in collaboration with [Cipack \(University of Parma\)](#), represents a pioneering effort to quantify the eco-footprint of bottling systems within the food and beverage sector. This initiative seeks to significantly enhance production sustainability by offering comprehensive insights into the environmental impacts of bottling operations, highlighting the importance of collaborative efforts in driving industry-wide eco-friendly practices.

Criteria	Details
Strengths	The project's strengths are rooted in its application of advanced automation and digital solutions, which drive substantial operational efficiencies and resource conservation, namely significant reductions in water and energy consumption.
Target Audience	Targeted primarily at food and beverage producers, the LCA project offers valuable insights and strategies for minimizing environmental footprints while optimizing resource utilization. It serves as a critical resource for industry players.
Collaborations	The collaboration with Cipack (Univ. of Parma) is integral to the project, enabling the exchange of real-time data and a data-driven approach to sustainability.
Results & Impact	The project has led to remarkable advancements, including the development of new bottling machinery that achieves up to 93% water savings and 31% energy savings, verified by TÜV certifications.
Alignment with AF4F Objectives	The project's critical role of sustainable production practices and stakeholder engagement in fostering a more responsible and eco-conscious food sector closely aligns with A4F4.

4.6 - Greece Factsheet

4.6.1 - Overview of Greece's Agri-food sector

Greece's agricultural sector, deeply rooted in the country's culture and economy, is marked by its small-scale farms and significant rural population. The sector is critical for the nation's food security, yet it faces challenges such as a lack of young farmers and the need for modernization. Greek agriculture, renowned for products like olive oil and feta cheese, is at a crossroads between maintaining traditional practices and embracing sustainable innovation. In line with the EU's broader goals, Greece aims to enhance its agricultural sector through environmental stewardship, economic resilience, and social inclusion. Below are key recommendations for Greece's CAP Strategic Plan:

- **Fostering a Smart, Resilient, and Diversified Agricultural Sector Ensuring Food Security:** Addressing income volatility and disparities, this segment focuses on enhancing risk management and boosting investments in quality and organic production. The aim is to increase farm resilience and competitiveness, ensuring a stable and secure food supply.
- **Bolstering Environmental Care and Climate Action:** Emphasizing the reduction of greenhouse gas emissions, particularly from livestock, and promoting renewable energy production. This section also advocates for efficient energy use and strategies to adapt to climate change, highlighting the need for sustainable resource management.
- **Strengthening Rural Socio-Economic Fabric:** This part underscores the importance of generational renewal in farming, gender equality, and job creation in rural areas. It also points out the potential for economic growth through sustainable forest management, enhancing the overall socio-economic condition of rural communities.
- **Promoting Knowledge, Innovation, and Digitalisation:** Focused on improving the Agricultural Knowledge and Innovation System (AKIS), this recommendation highlights the need for expanding broadband coverage and leveraging technology to address environmental and social challenges in agriculture.
- **Specific Strategic Recommendations:** This section outlines detailed actions for improving agricultural competitiveness and adopting environmentally friendly practices. It calls for a reduction in pesticide usage, enhancements in animal welfare, and the promotion of healthier diets. The recommendations directly address specific challenges and opportunities within the Greek agricultural sector

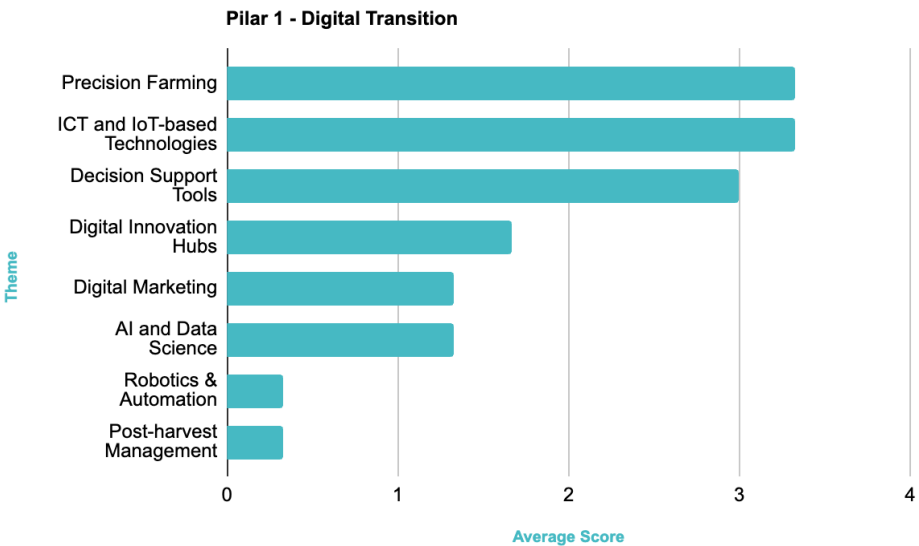
Table 13 - Greece Factsheet: general agrifood characteristics

Country	Population	Rural Population	Number of Farms	Farm Characteristics	Agricultural Economy
Greece	Approx. 10.7 million	31% live in rural areas	700,000	Average size of 7 ha; diverse output; strong in olive oil, cotton, fruits & vegetables	Employs around 400,000 people; significant constraints due to natural conditions; efforts towards sustainability and modernization

4.6.2 - AF4F Pillar Analysis

Pillar 1 - Digital Transition: Greek respondents emphasize the significance of "Precision Farming" and "ICT and IoT-based Technologies" as primary focus areas, underscoring a trend towards technology-driven and data-informed agricultural practices. "Decision Support Tools" also receive considerable attention, highlighting the importance of tools that facilitate informed agricultural decisions. "Digital Innovation Hubs" seem to highlight the desire for greater expertise sharing and technology transfer via collaborative networks.

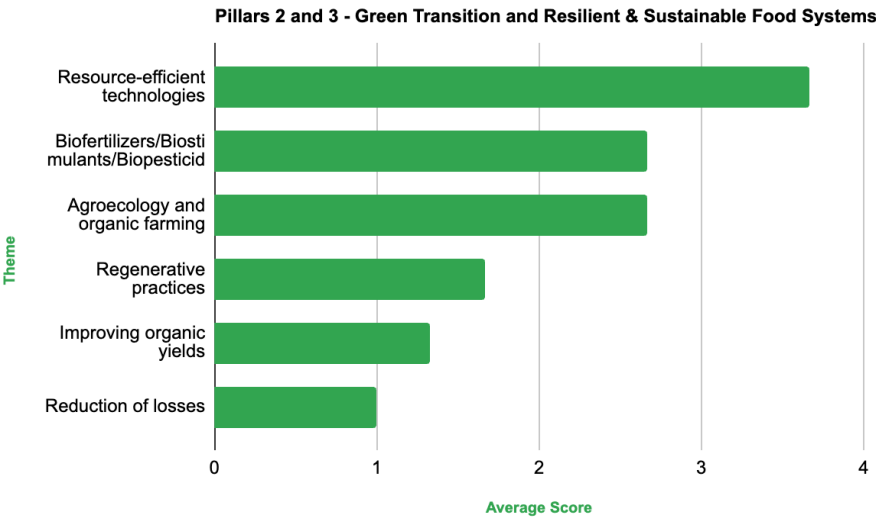
Figure. 16



Pillars 2 and 3 - Green Transition and Resilient & Sustainable Food Systems: Greek respondents emphasize "Resource-efficient technologies" and "Agroecology and Organic Farming," indicating a strong focus on sustainable farming and resource optimization. "Biofertilizers/Biostimulants/Biopesticides" also emerge as key, highlighting the trend towards

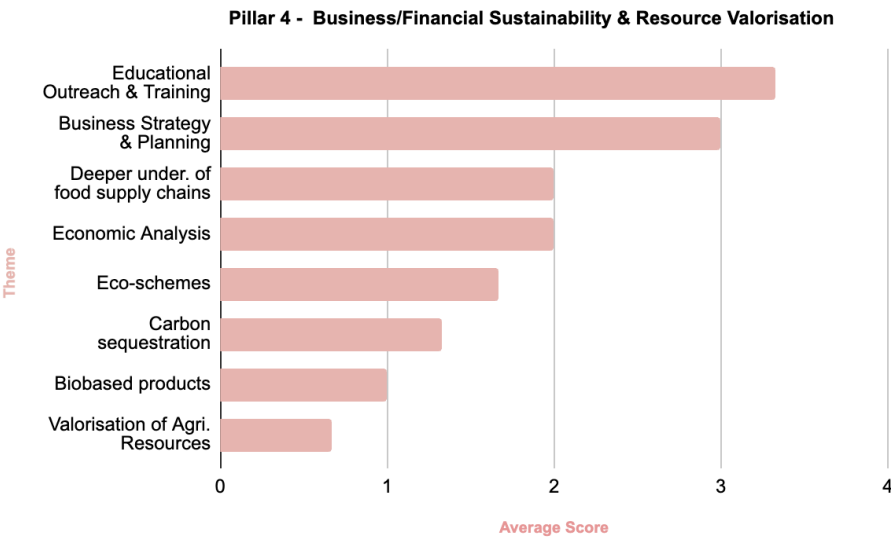
enhancing soil health. "Regenerative practices", "Improving Organic Yields", and "Reduction of losses" are acknowledged areas, highlighting a broader perspective on sustainable agriculture that encompasses both productivity and environmental restoration.

Figure. 17



Pillar 4 - Business/Financial Sustainability & Resource Valorisation: Greek respondents highlight "Educational Outreach & Training" as pivotal for agricultural advancement, indicating a focus on skill development and knowledge transfer. "Business Strategy & Planning", "Deeper Understanding of Supply Chains", and "Economic Analysis" are also key, pointing to a strategic approach to agricultural economics. "Eco-schemes" and "Carbon Sequestration" reflect a shift towards sustainable business models.

Figure. 18



4.6.3 - Case Studies and Best Practices

Table 13 - Recent and Contemporary Innovative Projects by Greek Entities

Best Practice	AGF4F pillar	Main topics
FRIETS	1 - Digital Transition	Precision farming
Biovalue	1 - Digital Transition	Decision support tools
Convert2Green	2-3 - Green Transition	Resource efficient technologies
RegAgri4Europe	2-3 - Green Transition	Agroecology and Organic Farming, Improving Organic Yields
Keagro	4 - Business & Resource Valorisation	Educational Outreach, Business Strategy and Planning
agroBRIDGES	4 - Business & Resource Valorisation	Educational Outreach, Business Strategy and Planning, Deeper Understanding of Supply Chains

[FRIETS](#), initiated in September 2021 and concluding in August 2025, is a pioneering venture steered by REZOS BRANDS in Greece. It is at the forefront of sustainable berry snack production, employing precision agriculture and cutting-edge dehydration technologies. This [EU-funded initiative](#) stands out for its commitment to low-impact production, food quality, and personalized nutrition. With an array of international SMEs collaborating, FRIETS is making strides in optimizing berry quality and longevity, contributing significantly to the domain of healthy snacking.

Criteria	Details
Strengths	Focused on delivering high-quality, nutritious berry snacks; employs precision agriculture to enhance the quality and sustainability of berry production.
Target Audience	General consumers with a special emphasis on providing personalized nutrition for specific demographics such as children, athletes, and those with dietary restrictions.
Collaborations	A collaborative effort involving cross-disciplinary scientists and an international network of SMEs, all dedicated to the sustainable development and optimization of the berry value chain.
Results & Impact	Expected to produce berry snacks with enhanced nutritional profiles and longer shelf life; aims to innovate in dehydration techniques and edible coatings for better food preservation.

Alignment with AF4F Objectives	Aligns with AF4F's sustainability goals by optimizing berry production for better nutrition and environmental impact; incorporates precision agriculture and innovative post-harvest processing.
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The [BIOVALUE project](#), led by Aristotle University of Thessaloniki, examines the link between biodiversity and the agro-food value chain, with a focus on underutilized crops. Running until September 2025, it centers on the BIOVALUE TOOL, an innovative simulation for analyzing agri-food biodiversity. The [EU-endorsed project](#) aims to bring diverse crops like cereals and legumes into mainstream markets, creating sustainable culinary products that boost agro-biodiversity and meet consumer demands.

Criteria	Details
Strengths	Advances the agri-food value chain through innovative, eco-friendly farming and processing methods, emphasizing the use of diverse crops for enhanced food products.
Target Audience	Aims to meet the nutritional needs of diverse consumer groups, including children, the elderly, and those with specific dietary requirements like diabetics or athletes.
Collaborations	Involve a wide-ranging partnership of universities, SMEs, and research institutions, combining expertise for a multidisciplinary approach to sustainable food solutions.
Results & Impact	Initiates breeding programs and precision agriculture techniques to produce quality berries, extending shelf life and maintaining nutritional value for consumer benefit.
Alignment with AF4F Objectives	Supports AF4F's sustainable practices by promoting biodiversity, reducing environmental impact, and contributing to the circular economy with new biobased food products.

The [Convert2Green project](#), steered by the National Technical University of Athens, is set to pioneer the Green Transition in Europe. With a focus on integrating circular and carbon-neutral materials into key sectors like clean vehicles, smart health, and clean energy, this initiative is aligned with the AF4F project's sustainability ambitions. The [project's](#) Open Innovation Test Bed will analyze eco-impact from materials to service products and aims to link new material suppliers with business opportunities, fostering an eco-friendly innovation network. By the project's end in December 2025, it seeks to solidify new standards for sustainable European industries.

Criteria	Details
Strengths	Convert2Green is pioneering an Open Innovation Test Bed to integrate circular and carbon-neutral materials into European Key Value Chains, fostering a more connected and integrated innovation ecosystem.
Target Audience	The primary beneficiaries are SMEs, start-ups, and large enterprises involved in the development of novel, bio-based, recyclable, recycled, or upcycled materials within key value chains.
Collaborations	This project involves an extensive network of partners, including material suppliers, industry experts, and research institutions across Europe, to facilitate the transition to climate-neutral materials.
Results & Impact	Convert2Green is expected to accelerate the market entry for innovative materials, contributing to Europe's transition to a low-carbon, circular economy. The project's open call aims to support companies in deploying sustainable materials innovations.
Alignment with AF4F Objectives	The project complements the AF4F goals by advancing sustainability and promoting a green transition in various key European value chains, indirectly benefiting the agri-food sector through its commitment to eco-impact analysis and the development of climate-neutral materials

The [RegAgri4Europe](#), standing for "Upgrading the Agricultural Sector with Skills in Regenerative Agriculture", developed a specialized curriculum in Regenerative Agriculture aimed at transforming agricultural practices through sustainable farming education. From January 2021 to December 2022, RegAgri4Europe synergized the expertise of six partners under [Erasmus+](#), prominently featuring three Greek entities, including the Agricultural University of Athens. By instructing apprentices and seasoned professionals in techniques that bolster ecological resilience and fortify the agri-food sector (such as revitalizing soil health, and advancing environmentally considerate agriculture), the project sought to mitigate the adverse effects of conventional cultivation practices prevalent across the EU.

Criteria	Details
Strengths	Pioneers an educational shift by designing an innovative web-based curriculum that educates on sustainable farming methods such as soil regeneration and biodiversity enhancement.
Target Audience	Primarily targets apprentices and agricultural professionals, equipping them with cutting-edge knowledge to pivot towards eco-conscious cultivation techniques.
Collaborations	A collaborative network that includes seven partners from Germany, Belgium, and Greece, highlighting the Agricultural University of Athens' pivotal role.

Results & Impact	Successful development and launch of a comprehensive web-based training program on Regenerative Agriculture, anticipated to bridge the knowledge gap and facilitate a shift to sustainable farming across Europe.
Alignment with AF4F Objectives	Directly aligns with AF4F by promoting eco-friendly farming practices, contributing to a sustainable agri-food value chain, and echoing the project's emphasis on green transition and sustainability.

[KEAGRO AUTH](#), established by the Aristotle University of Thessaloniki, focuses on sustainable development in Greece's agri-food sector. This interdisciplinary center has united over 16 laboratories from diverse fields such as Agriculture, Biology, and Chemistry. KEAGRO AUTH focuses on eco-efficient agricultural practices, fostering sustainability, and bolstering national and local competitiveness, including activities such as certification of agricultural protocols, and innovative product development.

Criteria	Details
Strengths	KEAGRO AUTH leverages multidisciplinary expertise to advance sustainable agricultural practices, focusing on quality, safety, and eco-efficiency across the agri-food chain.
Target Audience	The initiative serves a broad spectrum of stakeholders including researchers, educators, farmers, SMEs, and policy-makers, with a special focus on the agricultural community.
Collaborations	A collaborative network of 16+ labs across various disciplines within AUTH, linking academic research with practical applications in agriculture.
Results & Impact	KEAGRO AUTH contributes to sustainable rural development, efficient water management, and innovation in agri-food products, particularly in the realm of personalized nutrition.
Alignment with AF4F Objectives	The initiative supports AF4F's sustainable and resilient food systems pillar by fostering sustainable development and competitiveness in the agri-food sector at both national and local levels.

The [agroBRIDGES initiative](#), led by Q-PLAN INTERNATIONAL ADVISORS PC in Greece, was part of the EU Horizon 2020 scheme from January 2021 to December 2023. It aimed to bolster Short Food Supply Chains (SFSCs), improving direct links between producers and consumers. The project advanced sustainable agriculture by fostering farmer collaboration, enhancing producer-consumer bonds, and cutting transport costs and emissions. agroBRIDGES provided farmers with innovative models for SFSCs, aiming to improve their market stance by minimizing intermediaries.

Criteria	Details
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Strengths	agroBRIDGES championed a holistic, multi-actor approach to strengthen SFSCs, directly engaging over 400 participants in collaborative innovation to improve farmers' market positions and promote sustainable agriculture.
Target Audience	Designed for a diverse agri-food sector, including producers, consumers, distributors, and scientists, the project emphasized practical support and knowledge transfer to enhance SFSCs.
Collaborations	A consortium of 15 partners from 11 countries, agroBRIDGES facilitated cross-border cooperation, integrating regional and pan-European expertise to support sustainable agri-food practices.
Results & Impact	The project's impact includes the development of a comprehensive toolbox to support SFSCs, training of 150 stakeholders, and anticipated increases in farmer income and farm participation in direct sales, contributing to a more sustainable agri-food sector.
Alignment with AF4F Objectives	It aligns with AF4F's objectives by fostering green transition and sustainability within the agri-food value chain. The project's focus on SFSCs supports environmental health and enhances the resilience and sustainability of the agricultural sector, resonating with AF4F's emphasis on sustainable and resilient food systems.

PART 5 - CONCLUDING REMARKS FOR VET AND HIGHER EDUCATION PROVIDERS

The Agrifood4Future project sets out to establish Centers of Vocational Excellence (CoVEs) focused on smart farming and sustainable food systems throughout Europe. This initiative aligns with the urgent need for the agriculture sector's digitalization, decarbonization, and sustainability, intending to break down existing barriers and foster innovative agricultural practices.

At its core, Agrifood4Future aims to educate and train agrifood professionals, equipping them with the skills to embrace and implement cutting-edge practices. This endeavor is crucial not just for enhancing the agri-food sector's appeal as a career path, but also for fulfilling the aspirations of the EU Green Deal and the interlinked policy priorities outlined in the report's initial sections.

This comprehensive report delves into the current practices and policy trends within the project's four pillars: Digital Transition, Green Transition, Resilient and Sustainable Food Systems, and Business/Financial Sustainability & Resource Valorization, leading to the creation of CoVE Country Fact Sheets. These sheets begin with an overview of each country's agri-food sector, highlight national partners' perspectives on key technological areas, and analyze six

innovative initiatives or best practices per country, in tune with consortium priorities and the overarching goal of propelling the European agrifood sector forward.

In concluding, we spotlight potential green business models that could herald a more resilient and progressive European agrifood sector, aligning with the ambitions of farmers, citizens, and the broader societal and planetary needs:

Potential New Green Business Models for AGRIFOOD4FUTURE

- **Smart Farming Solutions:** Leveraging precision farming, robotics, AI, and IoT, this business model can offer tailored solutions for different farming needs. Supported by the Digital Europe Programme and Horizon Europe, this has the potential to bring high precision and efficiency to farms.
- **Sustainable Urban Farming Ventures:** With the rise of indoor farming, hydroponics, and vertical farms, new businesses can target urban populations providing fresh, locally-sourced produce. The European Green Deal and Farm to Fork Strategy offer a framework to drive this forward.
- **Bio-Innovation Companies:** Combining the development of new proteins, biopesticides, and biobased products, this model aims to provide sustainable alternatives to traditional inputs and products in the agricultural sector. Policy incentives from the European Commission and the Biodiversity Strategy 2030 would be pivotal.
- **Resource-Efficient Agroecology Firms:** With a focus on organic farming, optimizing water management, and reducing losses, these businesses prioritize sustainable practices to boost yield and soil health. With the EU Mission: A Soil Deal for Europe and [AKIS & EIP-AGRI framework](#), there is a pathway for growth and innovation.
- **Digital Agrifood Knowledge Platforms:** These can be digital hubs or innovation centers that provide training, up-to-date R&D insights, and bridge the gap between traditional practices and modern technological advances. The Skills Partnership for the Agrifood Ecosystem and the EU Skills Agenda can provide the necessary push for such initiatives.
- **Green Supply Chain Consultancies:** Leveraging blockchain, AI, and a deep understanding of food supply chains, this model will provide solutions for transparency, traceability, and sustainability in the agrifood sector. The Digital Europe Programme can be a significant booster for such ventures.
- **Carbon Farming Initiatives:** With a focus on carbon sequestration and advanced bio-refineries, businesses can contribute to climate neutrality while also benefiting

from the CAP measures and the carbon farming initiative under the [European Climate Pact](#).

- **Agri-Educational Ventures:** Given the dynamic changes in the agrifood sector, there is a substantial need for continuous educational outreach, training, and digital literacy. Drawing support from the EU Skills Agenda and the Council's proposal for learning on environmental sustainability, businesses can provide tailored educational solutions for various stakeholders.

These innovative business models, informed by the project's analysis and aligned with EU policy priorities, offer a roadmap for VET and higher education providers to modernize agrifood education, ensuring the sector's relevance and resilience in the face of future challenges.

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