Carbonica

Low-carbon Farming: building a sustainable future

White paper

Policy Landscape and Gap Analysis in the Context of Carbon Farming (focus on Greece, North Macedonia, Cyprus)

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Executive Summary

The White Paper **Policy Landscape and Gap Analysis in the Context of Carbon Farming (focus on Greece, North Macedonia, Cyprus)** is the second in a series of policy white papers that will be developed under the CARBONICA project. This paper provides a multi-layered approach to understanding policy landscape and effectiveness, identifying gaps based on literature review and stakeholder perspectives regarding carbon farming (CF) and digital transformation in agriculture across Greece, Cyprus, and North Macedonia.

Chapter 1: Introduction

This chapter provides an overview of the CARBONICA project and introduces the concept of carbon farming as a sustainable agricultural approach that contributes to climate change mitigation. It highlights the importance of supportive policies, cross-sectoral collaboration, and the role of this white paper in informing future actions in Greece, North Macedonia, and Cyprus.

Chapter 2: Mapping Current Policies, Institutions and Legislation in the Context of Carbon Farming in Greece

The chapter 2 outlines the main institutions, strategies, and policy frameworks that influence carbon farming in Greece. It presents the national efforts to address climate goals, promote sustainable agriculture, and support digital innovation, with an emphasis on existing policy tools and governance structures.

Chapter 3: Policy Gaps Analysis in the Context of Carbon Farming with Focus on Greece

This chapter 3 identifies the main challenges and gaps in Greece's policy environment that may limit the development of carbon farming. It highlights issues such as insufficient financial incentives, limited knowledge and advisory services, and the need for better coordination and monitoring systems.

Chapter 4: Mapping Current Policies, Institutions and Legislation in the Context of Carbon Farming in North Macedonia

The chapter 4 provides an overview of the institutional and policy landscape in North Macedonia. It describes how national strategies, aligned with EU goals, address climate action and agricultural development, while emphasizing the roles of public agencies and support mechanisms.

Chapter 5: Policy Gaps Analysis in the Context of Carbon Farming with Focus on North Macedonia

This chapter discusses the main policy needs and barriers related to carbon farming in North Macedonia. It points to gaps in training, research, funding, and institutional coordination, and calls for targeted actions to support sustainable practices in the sector.

Chapter 6: Mapping Current Policies, Institutions and Legislation in the Context of Carbon Farming in Cyprus

The chapter 6 maps the key national authorities and policies relevant to carbon farming in Cyprus. It outlines national climate and agricultural strategies, environmental objectives, and funding programs that provide a foundation for the promotion of sustainable land use and soil management.

Chapter 7: Policy Gaps Analysis in the Context of Carbon Farming with Focus on Cyprus

This chapter highlights key challenges in Cyprus, including limited awareness, technical and financial constraints, and the need for stronger integration of carbon farming into national strategies. It emphasizes the importance of tailored support, training, and stakeholder collaboration.

Chapter 8: Conclusion

The final chapter summarizes the common findings across the three countries. While all have made progress in aligning with EU priorities, carbon farming remains underdeveloped. Key gaps include lack of formal recognition, limited incentives, weak coordination, and digital readiness. The chapter calls for coherent strategies, improved governance, and stronger regional cooperation to support the transition toward low-carbon agriculture.

1 Introduction

As the global urgency to mitigate climate change intensifies, carbon farming has emerged as a strategic pathway to transform agriculture into a climate-positive sector. By promoting practices that increase carbon sequestration in soil and biomass, carbon farming can simultaneously reduce greenhouse gas emissions and enhance soil health, biodiversity, and farm resilience. However, the successful implementation of carbon farming relies not only on technical innovation but also on robust, aligned, and forward-looking policy frameworks.

This white paper presents a comparative policy landscape and gap analysis focused on three widening countries under the Horizon Europe-funded CARBONICA project—Greece, Cyprus, and North Macedonia. It aims to support policymakers, researchers, and stakeholders in understanding the readiness and barriers of national policies related to carbon farming and the broader digital and green transition in agriculture. Through an in-depth review of institutional frameworks, national legislation, strategic plans, and stakeholder insights, the paper identifies key enablers and obstacles within each country's governance context. Particular attention is given to the alignment with the European Green Deal, Common Agricultural Policy (CAP), and the EU Digital Strategy, as well as the extent of integration of carbon farming in Smart Specialization Strategies. The findings are based on desk research, interviews, and surveys conducted within the CARBONICA project framework. This comprehensive approach ensures that both formal policy structures and on-the-ground perceptions are considered in shaping targeted recommendations for advancing low-carbon farming systems.

Ultimately, this analysis contributes to strengthening regional collaboration through the CARBONICA Excellence Hub and serves as a foundation for developing policy masterclasses, capacity-building initiatives, and actionable strategies for climate-resilient agriculture in the Mediterranean and Western Balkans.

1.1 Carbonica project contribution to regional collaboration

The CARBONICA project exemplifies regional collaboration among Greece, North Macedonia, and Cyprus. Funded by the Horizon Europe Programme, CARBONICA aims to connect the carbon farming ecosystems of these countries through the establishment of the CARBONICA Excellence Hub. The project focuses on implementing agricultural practices that enhance carbon sequestration, thereby contributing to greenhouse gas mitigation and promoting sustainable agriculture.

1.2 Widening Countries in Carbonica project

The CARBONICA Excellence Hub aims to promote carbon farming practices across Greece, North Macedonia, and Cyprus. This initiative focuses on connecting and strengthening the innovation ecosystems of these countries by fostering collaboration among key stakeholders, including policymakers, industry leaders, academia, and civil society. The goal is to enhance research and innovation in carbon farming, develop new business models for the agri-food industry that incorporate carbon sequestration, and reduce the carbon footprint in agriculture.

In each participating country, the project will create a Multi-Actor Platform (MAP) to bring together stakeholders from various sectors. These platforms aim to facilitate knowledge exchange, promote the adoption of carbon farming practices, and develop tailored strategies that address the unique needs and opportunities within each ecosystem.

Through these efforts, CARBONICA seeks to build sustainable, climate-resilient agricultural systems in the widening countries of Greece, North Macedonia, and Cyprus.

2 Mapping current policies, institutions and legislation in the context of Carbon Farming in Greece

2.1 Key National Authorities Responsible for Carbon Farming

- **Ministry of Environment and Energy:** Coordinates climate change strategies and policies, including those for the enhancement of carbon sinks.

The Ministry of Environment and Energy (YPEN) is the primary authority responsible for shaping and implementing Greece's policies on environmental protection, energy security and climate action. It oversees air pollution, urban planning, biodiversity conservation, water resource management, waste management and environmental licensing and plays a critical role in promoting renewable energy, energy efficiency, facing climate change and Greece's transition to a low-carbon economy. Additionally, it ensures that Greece meets its obligations under international environmental and climate agreements, such as the Paris Agreement and the European Green Deal. Through its directorates and agencies, the Ministry of Environment and Energy ensures sustainable practices are integrated across economic and societal sectors[1].

- **Ministry of Rural Development and Food**: Oversees agricultural policy. Key implementer of the European Common Agricultural Policy (CAP) in Greece.

The Ministry of Rural Development and Food is the governmental body responsible for agriculture, livestock, fisheries and rural development policy in Greece. Its duties include ensuring food security, supporting farmers and cooperatives, managing European CAP funds and safeguarding plant and animal health. The Ministry also promotes innovation in agriculture, improves agricultural infrastructure and works to modernize Greece's Primary Sector of the economy. In addition to fostering competitiveness in Greek agri-food products, it aims to ensure environmental sustainability and resilience in rural areas. The Managing Authority of the Greek Strategic Plan for CAP is responsible for implementing the interventions responding to climate change adaptation and mitigation both for Pillar I and Pillar II[2].

- **Ministry of Climate Crisis and Civil Protection**

This relatively new Ministry was created to tackle the increasing frequency and intensity of climate-related disasters in Greece, such as wildfires, floods and heatwaves. Its mission spans emergency preparedness, disaster risk reduction, civil protection coordination and climate crisis adaptation. It manages the response to natural disasters in coordination with local and international bodies and supports infrastructure projects that enhance climate resilience. The Ministry also drafts climate adaptation plans and contributes to Greece's national climate strategy. It has a growing role in integrating climate science into national safety and emergency frameworks[3].

- **Natural Environment & Climate Change Agency (N.E.E.C.A. - OFYPEKA):**

The Natural Environment and Climate Change Agency (OFYPEKA) is responsible for the protection, management, and sustainable development of the country's natural environment. Established to ensure the effective implementation of environmental policies, the agency oversees protected areas such as national parks, Natura 2000 sites, and other ecologically significant regions. The agency collaborates with local communities, scientific institutions, and international organizations to promote biodiversity conservation and address the challenges of climate change through integrated strategies and nature-based solutions.

The Natural Environment and Climate Change Agency also plays a vital role in Greece's national response to the climate crisis, particularly within the framework of the country's Climate Law (Law 4936/2022).

[1] Ministry of Environment and Energy. Ministry. https://ypen.gov.gr/
[2] Ministry of Rural Development and Food. Ministry. https://www.minagric.gr/en/
[3] Ministry of Climate Crisis and Civil Protection. Ministry. https://civilprotection.gov.gr/en

As a key implementing body of the Climate Law, NECCA supports the integration of climate adaptation and mitigation measures into the management of protected areas and ecosystems. The agency promotes nature-based solutions, such as wetland restoration, forest management, and biodiversity conservation, which enhance carbon sequestration and increase ecosystem resilience to climate impacts, while contributes to climate policy by gathering scientific data, coordinating with other governmental and regional authorities, and engaging local communities in sustainable practices that align with national and EU climate goals.

The agency also supports the development of methodologies to monitor and quantify carbon sequestration in these ecosystems, ensuring that natural carbon stocks are preserved and enhanced. While NECCA is not directly responsible for emissions trading or industrial carbon regulation, it plays a crucial indirect role by safeguarding land-based carbon sinks and promoting land use practices that align with Greece's carbon targets[4].

- **Payment and Control Agency for Guidance and Guarantee Community Aid (OPEKEPE):** Manages agricultural subsidies and CAP-related financial flows.

The Payment and Control Agency for Guidance and Guarantee Community Aid (OPEKEPE) is the national body in Greece responsible for implementing and managing agricultural subsidy payments funded by the European Union's Common Agricultural Policy (CAP). OPEKEPE oversees the disbursement of financial aid to farmers and agricultural stakeholders, ensuring compliance with EU regulations. It also monitors and verifies land use and agricultural practices through control mechanisms, including on-site inspections and remote sensing, to guarantee transparency and accuracy in aid distribution[5].

- **Green Fund**

The Green Fund operates under the Ministry of Environment and Energy and is responsible for financing projects that promote environmental protection, sustainable development and climate resilience in Greece. It allocates resources from environmental fines and EU funds to national and local initiatives such as urban regeneration, forest restoration, biodiversity conservation and environmental education. The fund also provides support for climate action programs, including energy efficiency improvements and ecosystem preservation. It serves as a crucial financial mechanism to help Greece meet its environmental and climate objectives[6].

- **Greek Agricultural Organization – ELGO DIMITRA**: Supports research, training and innovation in agriculture, including sustainable practices.

ELGO DIMITRA is Greece's main public research and certification body for agriculture and agri-food. It is supervised by the Ministry of Rural Development and Food and integrates activities related to agricultural training, scientific research, product quality certification and food safety controls. The organization supports innovation in the primary sector by developing sustainable farming practices and technologies through applied research. It also provides vocational training for farmers and rural professionals and certifies Protected Designation of Origin (PDO) and Protected Geographical Indication (PGI) products. ELGO plays a critical role in bridging science, policy and practice in Greek agriculture[7].

- **Universities and Academia**

In the evolving landscape of climate change, academia in Greece plays a pivotal role in shaping and influencing policies. As a bridge between scientific knowledge and practical application, Greek universities and research institutions are essential in developing evidence-based strategies to enhance carbon sequestration in agricultural systems.

Academic institutions conduct critical research on soil carbon dynamics, climate-smart agricultural practices and the socio-economic impacts of carbon sequestration. This research provides a scientific

[4] Natural Environment & Climate Change Agency. https://necca.gov.gr/en/home/
[5] Payment and Control Agency for Guidance and Guarantee Community Aid. https://www.opekepe.gr/en/
[6] Green Fund. https://prasinotameio.gr/
[7] Greek Agricultural Organization – ELGO DIMITRA. Public research body. https://www.elgo.gr/

foundation for designing effective, localized models tailored to Greece's diverse agro-ecological zones. Greek academics often serve as advisors to governmental bodies, contributing to the formulation of national climate strategies, including the integration of carbon farming into the Common Agricultural Policy framework. Their input ensures that policies are grounded in robust data, aligning environmental goals with the realities of Greek agriculture.

Universities and research centres also play a key role in education and outreach, training farmers, agronomists and policymakers on best practices. Academic expertise is crucial in developing reliable monitoring, reporting and verification (MRV) systems for carbon sequestration and carbon credits. These systems are necessary for Greece to participate in emerging carbon markets and to ensure transparency and accountability in climate action efforts.

Greek academic institutions engage in EU-funded research initiatives and collaborate with international bodies, helping align national carbon farming policies with broader European Green Deal objectives. This ensures that Greece remains at the forefront of innovative, science-driven climate policy.

2.2 Analysis of National Policies and Regulatory Frameworks for Carbon Farming

Existing policies and regulations related to carbon farming

- **National Climate Law 4936/2022[8] on the transition to climate neutrality and adaptation to climate change**:

This law sets Greece's legal framework on climate action. It includes provisions concerning emissions mitigation and adaptation to climate change and establishes a climate-neutrality goal by 2050.

Some of the key measures established in this law include that affect carbon farming:

a) setting a net zero target for 2050 and intermediated targets for 2030 and 2040 net GHG emissions,
b) measures and policies to strengthen adaptation to climate change at the lowest possible cost,
c) intermediate anthropogenic GHG emission mitigation targets for the years 2030 and 2040,
d) indicators for monitoring progress towards achieving the relevant objectives,
e) procedures for evaluating and readjusting the objectives and taking additional measures,
f) 5-year carbon budgets for each sector, including agriculture and land use, land use change and forestry (LULUCF),
g) net emissions targets and carbon footprint reporting obligations for municipalities, installations, and companies, by 2050, as bellow:

Under Greece's National Climate Law 4936/2022, specific greenhouse gas (GHG) emissions reduction targets and carbon footprint reporting obligations have been established for municipalities, installations, and companies, aiming to achieve climate neutrality by 2050.

Municipalities

First-level local government units (municipalities) are mandated to develop Emissions Reduction Plans. These plans must:

- Estimate the municipality's carbon footprint.
- Specify and prioritize measures for emissions reduction.
- Include an emissions inventory and set reduction targets for buildings, equipment, and infrastructure.
- Be verified by a certified entity.

[8] Government of Greece. (2022). *National Climate Law 4936/2022 on the transition to climate neutrality and adaptation to climate change.*

The targets set are a minimum net emissions reduction of 10% by 2025 and 30% by 2030, compared to 2019 levels. The initial plans were due by 31 March 2023. Updating these plans is a prerequisite for municipalities to access funding for energy-saving and climate change projects.

Installations and Companies

Entities holding A1 or A2 environmental permits, are required to:

- Quantify their 2019 GHG emissions (Scope 1 & 2).
- Plan actions to reduce GHG emissions by at least 30% by 2030, compared to 2019 levels.
- Submit annual GHG emissions reports by 31 October each year, starting from 2026.
- Failure to submit reports on time may result in fines of €50 per day of delay, up to 0.1% of the entity's annual income.

These measures are part of Greece's broader strategy to reduce net GHG emissions by at least 55% by 2030 and 80% by 2040, compared to 1990 levels, aligning with the European Union's climate goals.

Additionally, the law provides for the establishment of a voluntary national carbon market - as described in paragraph 3 of article 19 of the National Climate Law - which is currently under development and not yet operational.

- **National Climate and Energy Plan (NECP)[9]**.

The NECP stresses Greece's priorities and development potential in terms of energy and addressing climate change and aims to serve as the key tool for drawing up the national energy and climate policy, taking into account the European legal framework and the Paris Agreement. It covers a five-year period and includes forecasts for 2030, 2040 and 2050.

Role for carbon removal in national climate policy

Greece has acknowledged the key role that carbon dioxide removal plays in reaching climate neutrality by 2050 in its draft updated national energy and climate plan (NECP). The plan states that residual emissions will be compensated through "negative emissions and CO2 removals" by the land-use, land-use change and forestry (LULUCF) sector[10]. The plan quantifies what these residual emissions might be, aims for 93% emissions reductions not including the LULUCF sector and 99% compared to 1990 when including the LULUCF sector. The plan also sets indicative emissions reductions targets every five years between 2025 and 2050.

Forests are the largest carbon sink in Greece, therefore, most measures related to CDR revolve around increasing forests' carbon sink capabilities. The plan also mentions better agricultural practices to increase the LULUCF and agriculture sectors' net removals. Greece plans to use the Common Agricultural Policy's toolbox to incentivise the uptake of practices resulting in higher soil carbon removals. Climate adaptation measures are also at the forefront of LULUCF-related action, given the increasing risks of forest fires and desertification.

Carbon capture, utilisation and storage (CCUS) is one of the ten strategic priorities set out in the Greek NECP. This slew of technologies is set to play a key role in decarbonising the energy, industry and transport sectors. Besides substantial increases in renewable energy capacities, captured CO2 from biomass and pellet steam power plants will be used to produce gas and liquid fuels. For the transport sector, one third of fuel needs are forecasted to be met by advanced biofuels and 50% through synthetic fuels. The latter include renewable fuels of non-biological origin (RFNBO), for which direct air capture is mentioned as a source of CO_2. Regarding the industrial sector, cement production is of particular importance, as it constitutes a significant source of Greece's overall greenhouse gas (GHG) emissions. Given that cement manufacturing is classified as a hard-to-abate industry, it necessitates the

[9] Hellenic Ministry of Environment and Energy. (2019). National Energy and Climate Plan. https://energy.ec.europa.eu/system/files/2020-03/el_final_necp_main_en_0.pdf

[10] EU. (2021). Climate action in Greece. https://www.europarl.europa.eu/RegData/etudes/BRIE/2021/690685/EPRS_BRI(2021)690685_EN.pdf

implementation of advanced mitigation techniques tailored to its specific technological and process-related challenges.

- **Effort Sharing Regulation (ESR)[11]**

The Effort Sharing Regulation (ESR) is a key component of the EU's climate strategy, setting binding national targets for reducing greenhouse gas emissions in sectors not covered by the EU Emissions Trading System (EU ETS), such as transport, buildings, agriculture, and waste.

Under the European Union's Effort Sharing Regulation (ESR), Greece is required to reduce its greenhouse gas emissions by 22.7% by 2030 compared to 2005 levels. This target applies to sectors not covered by the EU Emissions Trading System (EU ETS), including domestic transport (excluding aviation), buildings, agriculture, small industry, and waste management.

This 22.7% reduction target represents an increase from Greece's previous commitment of a 16% reduction, reflecting the EU's broader ambition to cut emissions in these sectors by 40% collectively by 2030.

To achieve these goals, Greece has updated its National Energy and Climate Plan (NECP), aiming for a 58% reduction in overall greenhouse gas emissions by 2030 compared to 2005 levels. The plan includes increasing the share of renewable energy in electricity generation to 82% by 2030, up from the previous target of 66%.

These initiatives are part of Greece's broader strategy to achieve climate neutrality by 2050, aligning with the EU's Green Deal[12] and the "Fit for 55" package[13].

- **LULUCF**

In accordance with the EU Regulation on Land Use, Land-Use Change and Forestry (Regulation (EU) 2018/841)[14], Greece includes the LULUCF sector as part of its national climate strategy to contribute to overall greenhouse gas (GHG) emissions reduction targets. The LULUCF sector plays a dual role, acting both as a source and a sink of carbon dioxide, depending on land management practices and land use categories.

Greece's LULUCF emissions inventory[15] includes data on forest land, cropland, grassland, wetlands, settlements, and other land uses. Forests represent the most significant carbon sink, with managed forest land contributing the majority of CO_2 removals through natural absorption. Conversely, land conversion (e.g., deforestation or urban development) can result in emissions. The sector is therefore critical for maintaining carbon balance and achieving net-zero targets.

As part of its obligations under EU climate law, Greece must ensure that accounted emissions from LULUCF do not exceed removals, under the "no-debit rule." The country submits annual data and long-term projections through the National Inventory Report (NIR) and the National Energy and Climate Plan (NECP), aligning with its commitments under the Paris Agreement and the European Green Deal.

Efforts to enhance carbon sequestration include promoting sustainable forest management, reforestation, soil conservation practices, and restoration of degraded lands. The integration of LULUCF in Greece's broader climate framework aims to support the achievement of net climate neutrality by 2050.

[11] EU. (2021). The Effort Sharing Regulation (ESR) – Overview. https://climate.ec.europa.eu/eu-action/effort-sharing-member-states-emission-targets/effort-sharing-2021-2030-targets-and-flexibilities_en

[12] EU. (2019). The Green Deal. https://commission.europa.eu/strategy-and-policy/priorities-2019-2024/european-green-deal_en

[13] EU. (2023). Fit for 55. https://www.consilium.europa.eu/en/policies/fit-for-55/

[14] EU. (2018). Regulation (EU) 2018/841 of the European Parliament. https://eur-lex.europa.eu/eli/reg/2018/841/oj/eng

[15] Ministry of Environment and Energy. (2018). National inventory report of Greece for Greenhouse and other gases for the years 1990-2022. National inventory document. https://ypen.gov.gr/wp-content/uploads/2025/01/2024_NID_Greece.pdf

- **CAP Strategic Plan 2023–2027**[16][17]: Introduces the green architecture, offering support to carbon sequestration practices but without most of them being yet organized under a carbon farming frame.

Greece's CAP Strategic Plan for 2023–2027, approved by the European Commission in November 2022, outlines the country's approach to implementing the EU's Common Agricultural Policy (CAP) during this period. The plan aims to support a smart, sustainable, competitive, resilient and diversified agricultural sector, ensuring long-term food security. It also contributes to climate action, the protection of natural resources and the preservation and enhancement of biodiversity, while strengthening the socio-economic fabric of rural areas.

The plan focuses on improving competitiveness by promoting innovation and new technologies, fostering young entrepreneurship and securing a fair income for farmers. Moreover, it aims to reduce the environmental footprint of agriculture, with the main priority being the sustainable development of rural areas.

Financially, the plan allocates €13.4 billion, with €9.6 billion dedicated to direct income payments to farmers, €200 million for market measures and €1 billion for investment support measures related to rural development.

The plan also includes targeted income support and an additional redistributive payment to improve the viability of small- and medium-sized holdings, which represent the backbone of Greek agriculture.

Furthermore, the plan supports a wide range of interventions, addressing the specific needs of Greece and its territories, designed in line with a new result- and performance-oriented approach to deliver tangible results in relation to EU-level CAP specific objectives.

CAP strategic Plan is based on conditionality rules. Conditionality sets mandatory standards for all farmers, who are supported by CAP. One set of Good Agricultural and Environmental Condition Standards is devoted to Climate change.

Direct support interventions at the current programming period, are characterized by the introduction of Eco schemes. Eco scheme are annual voluntary commitments for the farmers, and the 100% of their budget is supported by EU. Nine out of ten Eco schemes, included in CAP SP are serving among other specific targets, the climate change target of adaptation and mitigation.

Rural Development intervention serve among other specific targets, the, climate change mitigation and adaptation, the biodiversity conservation and the sustainable development and management of natural resources

The Rural Development Program[18] (in Greece supports sustainable agriculture through interventions that promote organic farming, biodiversity conservation and environmental protection. It provides funding and guidance to farmers and rural communities to enhance eco-friendly practices and improve rural infrastructure. However, the program currently lacks carbon-specific tracking mechanisms. A dedicated carbon footprint incentive has recently been introduced to the Rural Development Program and it is about the reduction of carbon footprint.in cotton, tomato and quinoa cultivations. There are also certain investments for which a producer can be supported through CAP SP serving carbon farming. Such investments are supported in the frame of the intervention for circular economy, the intervention of nonproductive investments but also the intervention of Farm improvement plans and in the intervention for water saving in agriculture.

[16] Ministry of Rural Development and Food. (2022). Greece's CAP Strategic Plan for 2023–2027. https://www.agrotikianaptixi.gr/wp-content/uploads/2024/03/synoptiko_keimeno_egkekrimenoy_ss_kap_2023-2027.pdf

[17] EC. (2022). At a glance: Greece's Cap Strategic Plan. https://agriculture.ec.europa.eu/system/files/2024-01/csp-at-a-glance-greece_en.pdf

[18] Ministry of Rural Development and Food. (2022). Greek Rural Development Programme. https://www.minagric.gr/2013-04-05-10-13-09/ministry-example/diavoylefsi-i-kap-meta-to-2020-list/12311-kap2023-2027-130122

- **Agricultural Knowledge and Innovation System (AKIS)**[19][20]

To increase the productivity of the agri-food sector and reduce its environmental and climate footprint, it is essential to leverage modern technologies at all stages of production, which in turn requires the effective dissemination of knowledge and the stronger connection between agricultural research, technology, and production. The implementation of the Agricultural Knowledge and Innovation System (AKIS), the use of Advisory Services, and the fundamental upgrading of the mechanisms, methods, and duration of Training Programs aim to address the current shortcomings in this area, particularly in Greece. AKIS serves as a comprehensive framework that integrates farmers, advisors, researchers, agri-businesses, educational institutions, NGOs, and policymakers, enhancing the flow of knowledge from research to practice and fostering innovation on farms. It ensures that researchers address real farming challenges, advisors are capable of translating scientific knowledge into practical recommendations, farmers have access to updated practices and can contribute their own innovations, and policymakers receive feedback from the ground. Key activities within AKIS include organizing farmer field schools, demonstration farms, and knowledge-sharing events; supporting Operational Groups where farmers and researchers collaborate; strengthening advisory services through enhanced training and certification; linking national research efforts with EU-level initiatives like Horizon Europe and EIP-AGRI; and promoting digital farming solutions through innovation hubs and data platforms. In the context of the CAP 2023–2027, Member States, including Greece, are required to strengthen their national AKIS by building robust advisory systems, improving cooperation between research, education, and farmers, and financing innovation projects that promote sustainability, climate resilience, and competitiveness. In parallel, and in accordance with the environmental requirements of Regulation (EU) 2021/2115, the CAP Strategic Plan (SP) places strong emphasis on achieving greater climate and environmental ambition. This ambition will be realized through the CAP's new "Green Architecture", structured around three main elements: Enhanced Conditionality, Eco-Schemes under Pillar I, and Climate- and environment-related interventions under Pillar II. Through these efforts, AKIS plays a vital role in supporting the transition toward more sustainable, competitive, and resilient agricultural systems.

- **European Green Deal**[21]

The goal is to achieve climate neutrality by 2050 while ensuring a fair and sustainable economy. It emphasizes the transformation of key sectors, including energy, transport, agriculture, and land use. In Greece, the Green Deal has inspired national strategies that promote low-carbon development and environmental resilience. One of the Deal's core initiatives, "**Farm to Fork**"[22] encourages sustainable agriculture, which directly connects to carbon farming — a set of practices that increase carbon sequestration in soils and vegetation.

- **European Climate Law**[23]

The European Climate Law legally enshrines the EU's commitment to achieving climate neutrality by 2050 and sets an intermediate target of reducing greenhouse gas emissions by at least 55% by 2030 compared to 1990 levels. It transforms political climate goals into binding obligations for all EU Member States, including Greece.

[19] EU. (2023). Agricultural Knowledge and Innovation Systems (AKIS). https://eu-cap-network.ec.europa.eu/support/innovation-knowledge-exchange-eip-agri/akis_en
[20] Ministry of Rural Development and Food. (2024). Establishment and composition of the National Committee for Agricultural Knowledge and Innovation Systems (AKIS) (Ministerial Decision No. 357/199475, Government Gazette B' 4081/12.07.2024). https://www.minagric.gr/images/stories/docs/agrotis/fek4081_120724_ya357.pdf
[21] EC. (2019). The European Green Deal. https://commission.europa.eu/strategy-and-policy/priorities-2019-2024/european-green-deal_en
[22] EC. (n.d.). Farm to Fork Strategy. https://food.ec.europa.eu/document/download/472acca8-7f7b-4171-98b0-ed76720d68d3_en?filename=f2f_action-plan_2020_strategy-info_en.pdf
[23] EU. (2021). Regulation (EU) 2021/1119 of the European Parliament and of the Council of 30 June 2021 establishing the framework for achieving climate neutrality and amending Regulations (EC) No 401/2009 and (EU) 2018/1999 ('European Climate Law'). https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=CELEX:32021R1119

- **Fit for 55**[24]

Fit for 55 is a comprehensive package of legislative proposals aimed at achieving the 55% emissions reduction by 2030 target outlined in the European Climate Law. Thus, it provides specific measures and policies targeting various sectors such as energy, transport, and agriculture.

- **Paris Agreement**[25]

The European Union, as a signatory to the Paris Agreement, has committed to the global effort to combat climate change by reducing greenhouse gas emissions and enhancing sustainability. In order to implement the objectives of the Paris Agreement, the EU adopted the European Climate Law, which establishes the legal framework for achieving climate neutrality by 2050. To operationalize this goal, the EU introduced the "Fit for 55" legislative package, aiming for at least a 55% reduction in net greenhouse gas emissions by 2030 compared to 1990 levels. This comprehensive package encompasses measures across all sectors of the economy to align EU policies with its climate ambitions. To implement these objectives, Greece is transitioning away from lignite-based energy, promoting renewable energy sources like wind and solar, and integrating climate policies into sectors such as transport, buildings, and agriculture. The country's actions under the Paris Agreement also support nature-based solutions, including sustainable land use and carbon farming practices, to boost natural carbon sinks.

Table 2.1 Policy Landscape (Greece)

Policy/Program	Focus Area (Ex. Digital Ag, Carbon Sequestration)	Challenges
NECP	Carbon Sequestration	a) No specialized targets for carbon farming, which is split between the ESR and LULUCF sectors, each with separate rules and goals. b) Long-term projections are uncertain, affected by technology, natural disasters, climate, and economic conditions.
National Climate Law	Carbon Sequestration	a) Issuing implementing laws to define details such as calculation methods, certification, and valuation of forest land. b) Coordination among implementing bodies mentioned in the Law. c) Monitoring of implementation by the responsible bodies.

[24] EC. (n.d.). Fit for 55. https://www.consilium.europa.eu/el/policies/fit-for-55/
[25] United Nations Framework Convention on Climate Change. (2016). Paris Agreement. https://unfccc.int/sites/default/files/english_paris_agreement.pdf

Policy/Program	Focus Area (Ex. Digital Ag, Carbon Sequestration)	Challenges
		d) Ex post evaluation of the Law's impact on carbon sequestration.
National Climate Change Adaptation Strategy	Soil and ecosystem Health, Sustainable soil management	a) Soil degradation due to erosion and changing rainfall patterns. b) Limited use of climate-resilient and carbon farming practices. c) Lack of integration of climate risks into agricultural policies. d) Insufficient research, data, and financial support for adaptation.
CAP Strategic Plan 2023–2027	Digital Agriculture & Carbon Sequestration	General support for eco-schemes, agri-environmental schemes and investments.
RDP and Agri-Environment Measures	Digital Agriculture	Complex procedures, low uptake of innovative practices
Green Finance and Investment Tools	Green & Digital Innovation	Low awareness and accessibility for smallholders

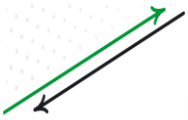
2.3 Smart Specialization Strategy in Relation to Carbon Farming

Greece's Smart Specialization Strategy[26] (S3) for 2021–2027 is a national and regional innovation policy framework that aims to transform the economy through targeted investments in areas where the country has competitive advantages. It emphasizes research, technology and innovation (RTI) to foster sustainable growth, enhance competitiveness and support the digital and green transitions.

The strategy identifies eight priority sectors: agro-food, biosciences and health, digital technologies, sustainable energy, environment and circular economy, transport and logistics, materials and industry and tourism and culture. These sectors were selected through an Entrepreneurial Discovery Process (EDP) that involves collaboration among businesses, academia, government and civil society. The S3 is funded through national and regional programs, including the EU's Cohesion Policy and the National Recovery and Resilience Plan. It is managed by a multi-level governance system that ensures coordination between national and regional authorities.

While the S3 supports innovation in environmental and circular economy sectors, it does not currently include specific mechanisms for tracking or incentivizing carbon farming practices.

[26] General Secretariat for Research & Technology. (2022). National Smart Specialization Strategy 2021–2027: Synopsis. https://gsri.gov.gr/wp-content/uploads/2022/11/Synopsis_National-Smart-Specialisation-Strategy-2021-2027.pdf



Key Priorities

Prioritizes digital agriculture and sustainable practices. Carbon farming can align through precision agriculture and bioeconomy.

- The Greek S3 strategy promotes innovation in agri-food and sustainable rural development.
- Digital technologies, data analytics and agro-ecological practices are prioritized.
- Carbon farming is not explicitly included but aligns with objectives such as sustainable agriculture, climate adaptation and digital transformation.

2.4 Implementation of the EU Digital Strategy at the National Level

National Digital Transformation Strategy (2020–2025)[27]: Emphasizes smart farming, digital tools and precision agriculture.

Greece's National Digital Strategy (NDS), particularly through the Digital Transformation Bible 2020–2025 and in alignment with the EU Digital Decade 2030, supports the modernization of the agricultural sector through advanced digital technologies. Although carbon farming is not directly addressed in the strategy, many of its initiatives lay the groundwork for practices that align with carbon sequestration goals.

One of the most significant efforts is the “Digital Transformation of Greek Agriculture” project, which is considered the first national-scale digital agriculture infrastructure in Europe. This project covers about 15 million acres and includes 20 of the country’s most important crops. It utilizes data from meteorological stations, satellites and over 6,500 earth stations distributed across Greece, offering a robust data-driven platform that enables farmers to adopt precision farming practices. These tools and technologies help optimize resource use, reduce environmental impact and improve crop management efficiency—key elements for supporting carbon farming methods such as reduced tillage, cover cropping and organic soil management.

Additionally, the strategy encourages the use of precision agriculture technologies such as drones, sensors and Earth observation systems. These enable real-time monitoring of soil health, water usage and crop growth, which are essential for assessing carbon inputs and emissions on farms. While the NDS does not yet include a dedicated framework for carbon-specific tracking or incentives, its digital infrastructure and focus on sustainable innovation create favorable conditions for integrating carbon farming practices in the future. The groundwork established by the NDS offers valuable tools and capabilities that could be further leveraged to support Greece’s transition to climate-smart agriculture.

Digital agriculture initiatives exist but lack coordinated implementation supporting carbon farming directly. Greece’s digital agriculture initiatives and carbon farming efforts are increasingly interlinked. The national digital agriculture transformation project integrates real-time data from satellites, sensors and weather stations. This infrastructure supports precision agriculture practices that reduce inputs like fertilizers and fuel, which directly contributes to lowering agricultural emissions. Practices like reduced tillage, efficient irrigation and crop rotation—all core to carbon farming—benefit from these digital tools that monitor soil health and optimize resource use.

Synergies between digital and green transformation are underutilized. Although Greece’s National Digital Strategy doesn’t yet explicitly include carbon farming, it establishes the digital infrastructure and capabilities that can support it. With policy alignment and targeted incentives, digital agriculture in Greece could become a strong enabler of climate-smart farming and carbon sequestration.

[27] Ministry of Digital Governance. (2023). The Greek National Digital Decade Strategic Roadmap: Digital Transformation Bible 2020–2025. https://digitalstrategy.gov.gr/website/static/website/assets/uploads/digital_decade_national_roadmap.pdf

3 Policy Gaps Analysis in the context of Carbon Farming with focus on Greece

As part of the CARBONICA project (Deliverable D1.1), a survey and a series of face-to-face interviews were carried out to assess the current state of the agricultural sector, particularly in relation to carbon farming practices and policies. The aim was to identify existing gaps, challenges and the specific needs of key stakeholders. The survey included 23 questions covering topics such as knowledge of carbon farming, existing challenges and potential interest in collaborating with the CARBONICA project. A total of 99 participants from Greece took part, including 30 farmers, 23 academics, 25 citizens, 4 industry representatives, 1 NGO representatives, 4 policymakers and 12 others. In addition, in-depth interviews were conducted with stakeholders possessing relevant expertise in agriculture and carbon farming.

Key Survey Findings with Policy Relevance:

- Farmers and landowners tended to concentrate on the challenges hindering carbon farming.
- Agribusinesses and consultants showed a stronger interest in devising strategies to overcome difficulties, focused on exploring economic motivations and the potential for new investment opportunities.
- Stakeholders agreed that the primary motivations for landholders to engage in carbon farming were financially driven, highlighting the chance of increasing income.
- The ability to enhance business resilience, diversify enterprises and mitigate risks must receive high priority by the stakeholders.
- Farmers and landowners identified financial incentives — such as income increase, business resilience, enterprise diversification, and risk mitigation — as the primary motivations for engaging in carbon farming.
- Lack of technical knowledge, insufficient information, concerns over implementation costs, and uncertainty about return on investment were highlighted as key barriers among farmers, landowners, consultants, and agribusinesses.
- Farmers expressed disappointment with existing carbon markets, citing low compensation, complicated paperwork, unpredictable credit calculations, and bias toward larger-scale agriculture. Concerns over greenwashing and lack of additionality in voluntary markets were also raised.
- Significant concerns were identified around data sharing, the risk of penalization by agri-food and financial sectors, high transaction costs for MRV (Monitoring, Reporting, Verification), and administrative burden.
- Scientists and policy-makers emphasized the inherent variability in agricultural emissions, especially concerning livestock and soil carbon dynamics, and the difficulties in accurately measuring, reporting, and verifying emissions at the farm level.
- Farmer decision-making was found to be influenced not only by economic factors but also by cultural and family considerations, which could affect the willingness to adopt new agricultural practices.
- The agricultural landscape was noted for its diversity, ranging from small family farms to large corporate holdings. Land acquisition by agribusinesses and competition from imports further challenged the viability of small and medium-sized farms. EU subsidies were viewed as vital support.
- Uncertainty regarding carbon pricing, environmental market regulations, and standards' credibility discouraged farmers and private sector actors from fully engaging in carbon farming and related investment opportunities.

3.1 Needs and Challenges for Carbon Farming

1. Financial Incentives and Economic Viability
- **Challenge:** Farmers are motivated by financial incentives but deterred by uncertain return on investment, upfront costs and the long-term nature of benefits.
- **Need:** Implement upfront subsidies, guaranteed minimum carbon prices and insurance products to offset investment risks.

2. Knowledge and Information Gap
- **Challenge:** Lack of accessible, relevant knowledge on carbon farming is a major barrier.
- **Need:** Establish tailored extension services, support farmer-to-farmer learning and integrate carbon farming into education/training.

3. Market and Administrative Challenges
- **Challenge:** Absence of markets for carbon-sequestering crops and complex administrative demands hinder adoption.
- **Need:** Create certification schemes, simplify administrative processes and reward early adopters.

4. Data and Privacy Concerns
- **Challenge**: Concerns over data privacy, ownership and high data costs disincentivize participation.
- **Need**: Develop standardized, privacy-conscious data platforms with incentives for data sharing.

5. MRV (Measurement, Reporting, Verification) and Policy Barriers
- **Challenge**: Difficulty in MRV at farm level and lack of policy alignment discourage adoption.
- **Need**: Invest in MRV technologies, reform policies to include carbon farming in GHG inventories and improve cross-sectoral coordination.

6. Carbon Market Concerns
- **Challenge**: Existing carbon markets are seen as unfair, complex and susceptible to greenwashing.
- **Need**: Enhance standards, ensure fair pricing, support small farmers and run public awareness campaigns.

7. Additionality and Dataset Limitations
- **Challenge:** A lack of comprehensive datasets and inconsistencies in adoption across regions complicate evaluation and advice.
- **Need**: Build inclusive, diverse datasets and support region-specific agronomic guidance.

8. Farmer Decision-Making Complexity
- **Challenge**: Decisions are influenced by cultural/personal factors, not just economic logic.
- **Need**: Acknowledge non-economic motivations in policy design and provide personalized support pathways.

9. Equity and Scale Issues
- **Challenge**: Small and medium farms feel threatened by corporate acquisitions and imports.
- **Need**: Ensure equitable market access, support for SMEs and fair subsidy allocation.

10. Administrative and Legal Misconceptions
- **Challenge:** Misunderstandings about taxes, carbon markets and credit mechanisms abound.
- **Need:** Provide legal guidance and streamlined information services to demystify regulations and rights.

3.2 Policy Gap Categories

In the context of Greece**,** using insights from the survey, interviews and relevant literature review, the following policy gap categories can be outlined:

1. Financial Instruments and Risk Management

Gap: Lack of upfront financial support, risk mitigation tools and investment incentives for farmers transitioning to carbon farming. Many Greek farmers operate on small-scale, low-margin family farms and are risk-averse due to economic precarity. The absence of tailored financial instruments (e.g., subsidies, carbon insurance) is a critical barrier.

2. Knowledge Transfer and Advisory Services

Gap: Weak agricultural extension services and absence of localized, practice-specific guidance on carbon farming. Extension services in Greece have been underfunded and fragmented. A clear policy gap exists in supporting regional advisory services that could help farmers navigate climate-smart agriculture.

3. Market Development and Carbon Valuation

Gap: Underdeveloped markets for carbon credits and lack of price guarantees or incentives for carbon-sequestered products. Greece lacks a domestic carbon farming marketplace. Most farmers are unfamiliar with carbon credit systems and market infrastructure to facilitate access is virtually absent.

4. Data Infrastructure, Digitalization and Privacy

Gap: Inadequate infrastructure for standardized, privacy-respecting data collection and sharing related to land use and carbon outcomes. Digitalization in Greek agriculture is uneven, especially in mountainous and island regions. Concerns over data ownership and potential penalization by authorities or private actors discourage data sharing.

5. MRV (Measurement, Reporting, Verification) Systems and Integration

Gap: Lack of integrated, streamlined MRV protocols aligned with national GHG accounting frameworks. Current Greek MRV efforts are focused on larger emissions sources, with agricultural emissions being poorly monitored and not well integrated into national climate strategies.

6. Education and Capacity Building

Gap: Absence of structured education programs on climate-smart practices within vocational and academic agricultural curricula. Agricultural training institutions in Greece rarely cover carbon farming or ecosystem services. This leaves a generational gap in knowledge and readiness for transitions.

7. Sociocultural Barriers and Behavioral Economics

Gap: Policies do not consider sociocultural factors influencing farmer decisions (e.g., family influence, tradition, community norms). Greek farmers often operate in tightly-knit rural communities with strong cultural traditions. Behavioral incentives and community-based transition models are largely absent from current policy tools.

8. Inequality Between Farm Sizes and Regions

Gap: Current support mechanisms disproportionately benefit large-scale operations or flatland regions. Greece's terrain is dominated by smallholders, mountainous agriculture and island farming—areas typically underserved by EU and national subsidies aimed at intensive or mechanized agriculture.

9. Fragmented and Incoherent Policy Landscape

Gap: Lack of coordination between environmental, agricultural and economic development policies. Overlaps and contradictions between CAP implementation, national sustainability goals and regional development plans cause confusion and reduce effectiveness of sustainability transitions.

10. Uncertainty and Mistrust in Carbon Markets

Gap: Lack of clear, transparent regulation for voluntary carbon markets and absence of oversight mechanisms. Farmers express skepticism about the legitimacy of carbon credits, fearing greenwashing and exploitation by third-party actors, especially given historical distrust in market-based solutions

Table 3.1 Policy Gap categories (Greece)

Gap Category	Description of Issue	Potential actions/Solutions
Definition & Standards	Lack of clear national definition or accepted carbon farming practices	Develop and adopt national guidelines aligned with EU certification frameworks
Monitoring & Verification	No MRV system for farm-level carbon data	Establish MRV protocols using geospatial tools, sensors and integrated databases
Incentives & Finance	Few direct incentives for carbon sequestration; complex grant procedures	Introduce results-based carbon rewards and targeted green financing programs
Knowledge & Training	Stakeholders lack access to technical knowledge or training opportunities	Launch dedicated extension services, e-learning and demonstration farms
Policy Integration	Fragmentation across environment, agriculture and energy policies	Create inter-ministerial working groups and align policies under a national carbon farming framework
Digital Infrastructure	Underuse of digital tools for monitoring, analytics and precision farming	Integrate digital farming solutions into carbon farming pilots and subsidy schemes

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4 Mapping current policies, institutions and legislation in the context of Carbon Farming in North Macedonia

4.1 Key National Authorities Responsible for Carbon Farming

Effective carbon farming requires a coordinated and well-structured institutional framework, where multiple government bodies collaborate to shape and implement policies aimed at reducing carbon emissions and enhancing carbon sequestration. This section outlines the primary national authorities engaged in carbon farming, detailing their individual mandates and how they contribute to the broader environmental and agricultural objectives. It also explores the inter-institutional coordination mechanisms that facilitate cohesive action toward sustainable land management and climate change mitigation. From environmental protection and agricultural development to financial support and forestry management, each institution plays a vital role in the successful implementation of carbon farming practices across the country.

- ***Ministry of Environment and Physical Planning***

The Ministry of Environment and Physical Planning is the core institution responsible for the protection and sustainable use of the national natural resources. Its key goal is to maintain environmental balance and protect ecosystems from various endangerment including pollution of air, water and soil. The Ministry is continuously monitoring and evaluating the state of the environment and preserving biodiversity and geodiversity. The management of national parks and restoration of the polluted ecosystems are also one of its main activities.[28]

- ***Ministry of Agriculture, Forestry and Water Economy***

The Ministry of Agriculture, Forestry and Water Economy is responsible for complete management and regulation of agricultural activities, forestry and water resources exploitation. This public authority is engaged in hydrological and agrometeorological measurements and implementation of protective measures for agricultural land and forests.[29]

- ***National Extension Agency***

The National Extension Agency is the main public advisory service provider for agricultural producers. This agency is responsible for the introduction of new technologies in cultivation and measures for production improvement. It is in constant collaboration with agricultural producers, their associations and other governmental bodies while also being the main channel of communication between research and academia and farmers. Furthermore, this agency is responsible for the direct implementation of measures for financial support in agriculture and provision of training and demonstration for state-of-the art technologies in agricultural production.[30]

- ***Agency for Financial Support in Agriculture and Rural Development***

The Agency for Financial Support in Agriculture and Rural Development was established with the objective of more successful implementation of the agricultural policy and the rural development policy in the country. This Agency enables efficient management of the financial resources both from the Budget of the Republic of North Macedonia and the funds from the European Union Pre-Accession Assistance for Rural Development (IPARD). It is also responsible for processing of applications for financial support, authorization of payment of funds, analyses and audits of the funding process and collection and processing of data.[31]

[28] Ministry of Environment and Physical Planning. (n.d.). *Ministry*. https://www.moepp.gov.mk/ministerstvohttps://www.moepp.gov.mk/ministerstvo
[29] Ministry of Agriculture, Forestry and Water Economy. (n.d.). *Home*. https://www.mzsv.gov.mk/Почетна.aspx,
[30] National Extension Agency. (n.d.). *About us*. https://agencija.gov.mk/about/
[31] Agency for Financial Support of the Agriculture and Rural Development. https://www.ipardpa.gov.mk/en/Page/Index/3

- ***Public Enterprise National Forests***

Public Enterprise National Forests is responsible for growing, protecting and sustainable exploitation of the forests. The main goals of National Forests are ensuring the permanent increase of forest cover, maintaining their useful functions and protecting the existing forestlands and agricultural fields within. Since forests are defined as one of the biggest carbon sinks, this public enterprise is part of the public authorities responsible for carbon sequestration/farming.[32]

4.2 Analysis of National Policies and Regulatory Frameworks for Carbon Farming

As a candidate country for European Union membership, North Macedonia is progressively aligning its national policies with EU climate and environmental standards. This section outlines key strategies and regulatory frameworks that influence the adoption of carbon farming practices. These policies reflect the country's efforts to reduce greenhouse gas emissions, promote sustainable land use, and integrate climate-resilient agricultural practices, as essential steps in harmonizing with the EU Green Deal and advancing toward EU accession.

Existing policies and regulations related to carbon farming

- ***Long-term Strategy on Climate Action and Action Plan (Ministry of Environment and Physical planning)***

This Long-term strategy on climate action and action plan outlines the country's vision, goals and measures to achieve low-carbon and climate-resilient development by 2050. It builds and aligns with the Paris Agreement and the 2030 Agenda for Sustainable Development. For the achievement of Specific objective 2: A Reduction of GHG emissions in agriculture of 50% by 2050 compared to 1990 levels, there is a projected adoption of measures to promote sustainable agriculture technologies and practices which will help carbon sequestration in soils. In line with this strategy, measures promoting the increase of carbon deposits in soils and supporting carbon sequestration practices are encouraged, which aligns with the EU Green Deal[33].

- ***4th National Plan for Climate Change (Ministry of Environment and Physical planning)***

This national plan presents the country's climate profile, highlighting the sectors and regions most vulnerable to the impacts of climate change while providing an analysis of potential adaptation measures. The report offers recommendations for capacity-building measures, facilitating financial investments, and improving technology transfer. Finally, it summarizes ongoing activities related to education, information, and public awareness of climate change. This plan includes measures for promotion of technologies and practices for enhancement of carbon stocks within agricultural lands, carbon sequestration and prevention of loss of soil organic matter. It also promotes technologies that improve carbon storage in agricultural soils, aligning with the EU Green Deal's efforts to reduce emissions and prevent the loss of organic matter in soils[34].

- ***National Strategy for Agriculture and Rural Development for the period 2021-2027 (Ministry of Agriculture, Forestry and Water Economy)***

The National Strategy for Agriculture and Rural Development 2021 – 2027 aims to strengthen the ability of North Macedonia's agricultural sector to compete in the EU and other regional markets and to promote

[32] Public Enterprise National Forests. http://www.mkdsumi.com.mk/zasumite_en.php?page=3&s=
[33] Long-term Strategy on Climate Action and Action Plan, Ministry of Environment and Physical planning https://api.klimatskipromeni.mk/data/rest/file/download/2ba0633b4385d2538862b16572bff16d13ad0895665ee2729d24e177022ace27.pdf
[34] 4th National Plan for Climate Change, Ministry of Environment and Physical planning https://api.klimatskipromeni.mk/data/rest/file/download/af4ef98a3215c3979d3e0d1f5077c50078c1cc17dbd362452ff5302f50a70dc8.pdf

sustainable and balanced rural development, while retaining the youth population through creating better living conditions. In the context of carbon farming within this strategy there are measures and policies for the development of the agricultural sector, rural development as well as policies for support of the implementation of climate and environmental conscious practices and policies for natural resource management and mitigation of the impact of climate change. This strategy includes support for practices that minimize climate change, which aligns North Macedonia with the EU CAP.[35]

- ***National Strategy for Sustainable Development for the period 2009-2030 (Ministry of Environment and Physical Planning)***

This strategy envisions a balanced and accountable development in the economic, social and environmental fields. The strategy projects implementation of the principles of sustainable development in the context of agriculture and rural development. This strategy was developed in 2009 and needs further improvement. It is based on sustainable development principles and includes measures for agriculture and rural development that need to align with the EU Green Deal[36].

- ***National Strategy for Nature Protection for the period 2017-2027 (Ministry of Environment and Physical Planning)***

The strategy focuses on the conservation and sustainable management of geodiversity, biodiversity, and natural landscapes. It connects to agriculture and soil by promoting sustainable land use, soil protection, and integrating nature conservation into agricultural policies. The practices that protect soil and nature are in line with the EU Green Deal.[37]

- ***Law on Agricultural Land (Ministry of Agriculture, Forestry and Water Economy)***

This law regulates the use, disposal, protection and conversion of agricultural land. It includes provisions on preventing land degradation, ensuring soil fertility, and encouraging environmentally responsible farming practices.[38]

- ***Law on Forests (Ministry of Agriculture, Forestry and Water Economy)***

This law regulates the planning, management, cultivation, protection, use and conservation of forests as a natural resource and forest land, the realization of the public benefit functions of forests, the rights and obligations of forest use, financing, as well as other issues of importance to forests and forest land according to the principle of biological, economic, social and ecological acceptability.[39]

Alignment of National Policies with EU Green Deal & CAP

North Macedonia is actively aligning its agricultural policies with the European Union's Common Agricultural Policy (CAP) as part of its EU accession process. This alignment involves significant reforms to harmonize national policies with EU standards, focusing on several key areas:

- ***Decoupling direct payments***

A pivotal reform is the transition to "decoupled" direct payments, shifting subsidies from being linked to specific production quantities to area-based payments. This approach aligns with the CAP's objective to reduce market distortions and promote sustainable farming practices. Studies indicate that decoupling

[35] National Strategy on Agriculture and Rural Development for the period 2021-2027, Ministry of Agriculture, Forestry and Water Economy https://faolex.fao.org/docs/pdf/mac209144english.pdf
[36] National Strategy for Sustainable development for the period 2009-2030, Ministry of Environment and Physical Planning: https://www.moepp.gov.mk/wp-content/uploads/2014/12/Nacionalna-Strategija-za-Odrzliv-Razvoj-vo-RM-NSSD-Del-1.pdf
[37] National Strategy for Nature Protection for the period 2017-2027, Ministry of Environment and Physical Planning: https://www.moepp.gov.mk/wp-content/uploads/2014/12/National-Strategy-for-Nature-Protection-2017-2027.pdf
[38] Law on Agricultural Land https://www.mzsv.gov.mk/CMS/Upload/zakonski%20izmeni/%D0%97%D0%B0%D0%BA%D0%BE%D0%BD%20%D0%B7%D0%B0%20%D0%B7%D0%B5%D0%BC%D1%98%D0%BE%D0%B4%D0%B5%D0%BB%D1%81%D0%BA%D0%BE%D1%82%D0%BE%20%D0%B7%D0%B5%D0%BC%D1%98%D0%B8%D1%88%D1%82%D0%B5.pdf
[39] Law on Forests https://www.mzsv.gov.mk/CMS/Upload/zakonski%20izmeni/%D0%97%D0%90%D0%9A%D0%9E%D0%9D%20%D0%97%D0%90%20%D0%A8%D0%A3%D0%9C%D0%98%D0%A2%D0%95.pdf

direct payments in North Macedonia could, on average, increase farmer incomes, though impacts may vary across different farm types and sizes[40].

- ***Instrument for Pre-Accession Assistance in Rural Development (IPARD)***

Through the IPARD program, North Macedonia receives financial and technical support to enhance its agricultural sector's competitiveness and sustainability. This assistance facilitates the gradual alignment with CAP standards, including improvements in food safety, veterinary, and phytosanitary measures. The IPARD III program, under the EU's Instrument for Pre-Accession Assistance (IPA III), continues to support these efforts[41].

- ***Administrative and Structural Reforms***

Reforming administrative structures is crucial for effective policy implementation. North Macedonia is enhancing its agricultural institutions to manage support payments, market mechanisms, and quality policies in line with CAP requirements. These reforms aim to build a competitive agricultural sector capable of integrating into the EU's internal market[42].

- ***National Strategies and Commitments***

North Macedonia has demonstrated a strong commitment to implementing the European Union's Green Deal through various strategic initiatives and collaborations. In its enhanced Nationally Determined Contribution (NDC), North Macedonia has pledged to reduce greenhouse gas emissions by 51% by 2030 compared to 1990 levels. This ambitious target aligns with the country's goal of achieving climate neutrality by 2050, in line with the European Green Deal. The enhanced NDC emphasizes the importance of transitioning to a low-carbon economy, decoupling carbon emissions from economic growth, and ensuring sustainable development[43].

- ***Green Finance Initiatives***

To support the green transition, North Macedonia has established the Green Finance Facility (GFF), a joint program implemented by UN agencies in collaboration with the government. The GFF aims to enhance access to finance for small and medium-sized enterprises (SMEs) and households, enabling investments in renewable energy and energy-efficient solutions. This initiative is expected to result in significant energy savings and a reduction in greenhouse gas emissions, contributing to the country's sustainable development goals[44].

- ***Sector-Specific Actions***

The country is also focusing on greening its economy by supporting at least 300 companies to innovate sustainably, grow, and create jobs in green businesses. This effort includes establishing a "Greening Business" Facility to promote sustainable economic development and enhance the competitiveness of the agricultural sector through sustainable practices in line with EU Green Deal[45] .

Reviewing available financial support for carbon farming at national level

The transition to carbon farming is critical for achieving sustainable agricultural practices and mitigating climate change. In North Macedonia, financial mechanisms such as national subsidies, carbon credit schemes, international grants, and private-sector investments are available to support the implementation of these practices.

[40] Decoupling direct payments in North Macedonia, FAO, https://openknowledge.fao.org/items/390fc365-4b2c-4465-bc9b-4c7b8bca9e5e
[41] Overview of EU pre-accession assistance for rural development (IPARD III), European Commission, https://agriculture.ec.europa.eu/international/international-cooperation/enlargement/pre-accession-assistance/overview_en
[42] Agriculture in EU enlargement, European Commission, https://agriculture.ec.europa.eu/international/international-cooperation/enlargement/agriculture-eu-enlargement_en
[43] Enhanced Nationally Determined Contribution, Ministry of Environment and Physical Planning, https://unfccc.int/sites/default/files/NDC/2022-06/Macedonian%20enhanced%20NDC%20%28002%29.pdf
[44] A new financing mechanism for green investments in North Macedonia, UNECE, https://w3.unece.org/sdg2024/story-8.html
[45] Action Document for “EU for Green Economy”, https://enlargement.ec.europa.eu/document/download/43f519a8-cf52-4079-b6ab-912d2d6ba5b8_en .

- ***National subsidies and government support***
  - Direct payments for sustainable practices: Farmers receive financial support for organic farming, cover cropping, and conservation tillage, which contribute to increased carbon sequestration and soil health[46].
  - Energy efficiency and renewable energy: Subsidies for investments in solar-powered irrigation systems and energy-efficient agricultural machinery.
  - Soil conservation measures: Financial support for soil conservation, afforestation, and water retention projects.[47]
- ***Development Bank of North Macedonia (DBNM)***
  - Credit lines for green investments: Offers favorable loans for projects focused on soil health, agroforestry, and composting[48].
  - Guarantee funds: Funds to reduce financial risks and support private-sector investments in carbon farming.[49]
- ***International Grants and Climate Finance***
  - Green climate fund (GCF): Grants for projects focused on climate-smart agriculture and carbon sequestration[50].
  - Global environment facility (GEF): Funds for projects promoting sustainable land management and biodiversity conservation.[51]
  - IPARD: Support for projects that align with EU environmental and climate goals, including soil health and agroforestry.[52]
- ***Private Sector Investments***
  - Impact investment and ESG Funds: Funds that finance projects for carbon sequestration and sustainable agricultural practices.[53]

[46] Ministry of Agriculture, Forestry and Water Economy. (n.d.). *Official website*. https://www.mzsv.gov.mk/
[47] Ministry of Environment and Physical Planning. (n.d.). Long-term climate action strategy and action plan. https://api.klimatskipromeni.mk/data/rest/file/download/da39fc5ee4edde466e63b7af6581e8e0a1a015cc4458b15fb6484f6958b127eb.pdf
[48] World Bank. (n.d.). *North Macedonia green growth*. https://www.worldbank.org/en/programs/competitiveness-for-jobs-and-economic-transformation/brief/North-Macedonia-Green-Growth?utm_source=chatgpt.com
[49]National Bank of the Republic of North Macedonia. (n.d.). *About NBRNM*. https://www.nbrm.mk/za_nbrm-en.nspx
[50] Food and Agriculture Organization of the United Nations. (2021). *Soil organic carbon mapping cookbook* (3rd ed.). https://openknowledge.fao.org/server/api/core/bitstreams/2b834a27-dd56-4119-9c01-1081daaf9939/content
[51] Global Environment Facility. (n.d.). *Official website*. https://www.thegef.org/
[52]European Commission. (n.d.). *IPARD initiatives: Pre-accession assistance for rural development*. https://agriculture.ec.europa.eu/international/international-cooperation/enlargement/pre-accession-assistance/ipard-initiatives_en
[53] Inter-Cert. (n.d.). *ESG reporting*. https://www.inter-cert.net/mk/esg-izvestuvane/

Table 4.1 Policy Landscape Assessment (North Macedonia)

Policy/Program	Focus Area (Ex. Digital Ag, Carbon Sequestration)	Challenges
Long-term Climate Action Strategy and Action Plan	Carbon Sequestration	Limited awareness on the long-term benefits of carbon farming
4th National Climate Change Plan	Carbon Sequestration	Gaps in local implementation and monitoring
National Strategy for Agriculture and Rural Development 2021-2027	Digital Ag & Carbon Sequestration	Lack of integrated digital tools for farmers Limited digital literacy among farmers Weak policy support for digital transformation
National Sustainable Development Strategy 2009-2030	Carbon Sequestration	Strategy is outdated and needs updating in the context of the EU Green Deal
National Nature Protection Strategy 2017-2027	Carbon Sequestration	Weak integration with agricultural practices
IPARD Program (Instrument for Pre-Accession Rural Development)	Digital Agriculture	Limited funding for green agriculture technologies
Green Finance Facility	Digital Ag & Carbon Sequestration	Small to medium enterprises struggle to access funding
Green Business Fund	Digital Ag & Carbon Sequestration	Limited awareness of green investment opportunities

4.3 Smart Specialization Strategy in Relation to Carbon Farming

The Republic of North Macedonia launched the process of development of the Smart Specialization Strategy in 2018 as a holistic approach for research and innovation which will enable sustainable economic growth built on the capacities of industry, science and society.

Smart agriculture is one of the priority domains in North Macedonia's Smart Specialization Strategy (S3). It focuses on leveraging innovation, technology, and knowledge to create high-value-added products and services in agriculture and food production. The strategy aims to enhance competitiveness, sustainability, and efficiency in the agricultural sector by integrating advanced technologies like precision farming, IoT, and data analytics.

While carbon farming isn't explicitly mentioned as a standalone focus, its principles align closely with the strategy's goals of promoting eco-friendly practices and enhancing agricultural sustainability. The strategy highlights the integration of advanced technologies and sustainable methods to improve productivity and environmental outcomes. Carbon farming, with its focus on soil health and carbon sequestration, could

naturally fit within these broader objectives, especially under initiatives aimed at green and sustainable growth. Implementation of this strategy will enable green and sustainable growth by integrating knowledge, innovation and technology resulting in the production of high value-added products and services competitive on international and domestic markets.

Within the national 3S strategy there are four vertical priority domains:

1. Smart Agriculture and Food with Higher Added Value
2. Information and Communication Technologies (ICT)
3. Electro-Mechanical Industry – Industry
4. Sustainable Materials and Smart Buildings

Mutually dependent and involved in cross-innovation with the vertical there are two horizontal priority domains:

1. Energy for the Future
2. Tourism

Carbon farming falls within the 1st vertical priority domains. The development of ITC enables implementation of different digital technologies like AI, big data, robotics, UAVs, sensors and communication networks connected through the Internet of Things in the agricultural sector. This results in the optimization of resource use, enhanced yields and lower environmental footprint. Some of these approaches are an integral part of carbon farming practices that sequester carbon in soil and biomass while others contribute to healthier soil ecosystems that act as crucial carbon sinks[54].

4.4 Implementation of the EU Digital Strategy at the National Level

Achievement of the objectives of EU`s Digital Strategy through the EU Digital Compass in the Republic of North Macedonia falls within the National ICT Strategy for the period 2023-2030. The strategy is aimed at a comprehensive digitalization of operations within public institutions, businesses and the general public while enabling implementation of innovative solutions. This implies everyday use of digital tools and technologies in all areas of society.

The strategy is based on 4 main pillars:

1. ICT infrastructure and enablers
2. Digital skills
3. Digital governance
4. Digital innovation and research
5.

Pillar 4 Digital innovation and research is comprised of three strategic objectives:

1. Support and digitalization of SMEs
2. Development and support of digitalization in science
3. Support for ICT innovations and the development of new technologies

The agricultural sector is an integral part of all strategic objectives and the implementation of digital technologies in the context of carbon farming is in correlation with the national S3 strategy[55].

[54] Smart Specialization Strategy of The Republic of North Macedonia S3-MK 2023-2027 DRAFT, Ministry of Education and Science, https://mon.gov.mk/stored/document/Draft%20S3%20MK.pdf .

[55] National ICT Strategy, Ministry of Information Society and Administration of the Republic of North Macedonia, https://ener.gov.mk/PublicDocuments/%D0%9D%D0%B0%D1%86%D1%80%D1%82%20%D0%9D%D0%B0%D1%86%D0%B8%D0%BE%D0%BD%D0%B0%D0%BB%D0%BD%D0%B0%20%D0%98%D0%9A%D0%A2%20%D1%81%D1%82%D1%80%D0%B0%D1%82%D0%B5%D0%B3%D0%B8%D1%98%D0%B0%202023-2030_%D0%9D%D0%B0%D1%86%D1%80%D1%82_id=71_version=2.pdf

5 Policy Gaps Analysis in the context of Carbon Farming with focus on North Macedonia

5.1 Needs and Challenges for Carbon Farming

As part of the Carbonica project (Deliverable D1.1), a survey and a series of face-to-face interviews were carried out to assess the current state of the agricultural sector, particularly in relation to carbon farming practices and policies. The aim was to identify existing gaps, challenges, and the specific needs of key stakeholders. The survey included 23 questions covering topics such as knowledge of carbon farming, existing challenges, and potential interest in collaborating with the Carbonica project. A total of 159 participants from the Republic of North Macedonia took part, including 92 farmers, 32 academics, 12 citizens, 8 industry representatives, 6 NGO representatives, 3 policymakers, and 6 others. In addition, in-depth interviews were conducted with stakeholders possessing relevant expertise in agriculture and carbon farming.

Key Survey Findings with Policy Relevance:

- Respondents expressed a clear **interest in adopting innovative agricultural solutions** and emphasized the importance of **knowledge exchange and experience-sharing** within the sector.
- The **primary motivation for agricultural activity** among participants is achieving **financial profitability and market expansion**, while **improving production efficiency** ranked as the least prioritized goal.
- A majority of respondents identified **climate change adaptation and sustainability** in agriculture as the **top challenge facing the EU**, followed by the **need for stable and sustainable farmer incomes**, and **insufficient promotion of rural development**.
- About **two-thirds of participants believe the Common Agricultural Policy (CAP)** plays a vital role in **supporting farmers** and ensuring **sustainable sector development**. However, some expressed that the policy requires **revisions to enhance fairness and long-term sustainability**.
- The **main challenges associated with EU and CAP-derived agricultural policies** include **rising production costs**, **increased competition from imports**, and **uncertainty regarding market trends and price stability**.
- There is strong **interest in carbon farming**, with the majority of respondents being **either somewhat or highly interested** in exploring these practices.
- Despite the interest, around **two-thirds of participants reported having only limited knowledge** of carbon farming methods and principles.
- Nearly **half of the respondents emphasized the need for training and awareness-raising** to support the uptake of carbon farming. The **development of sustainable agricultural practices** was also identified as a key priority.
- Respondents see the **main roles of research and innovation** as providing **advisory services and training for farmers**, as well as leading **pilot projects and practical case studies** focused on carbon farming technologies.
- In terms of financial support, **EU programs and national government subsidies** were identified as the **most appropriate funding sources** to advance carbon farming in North Macedonia.
- Most participants believe that **agricultural extension services and educational institutions** should lead **training efforts**, with fewer indicating that **government bodies, farming communities**, or **local organizations** should play this role.

Key Interview Findings with Policy Relevance:

- **Academic and research institution representatives** widely recognize the **adverse impacts of climate change** on agricultural yields, **soil health**, **profitability**, and **market competitiveness**. They emphasize that these challenges can be addressed through the **adoption of innovative agricultural technologies**, enhanced **sustainability practices**, **environmental protection measures**, and **soil restoration through carbon sequestration**.
- Experts from academia highlighted the urgent need to **update and expand academic curricula** to include **cutting-edge knowledge**, **modern technologies**, and **climate-smart agricultural practices** to better prepare future professionals for the evolving demands of the sector.
- **Farmers expressed strong belief in the potential of carbon farming** to effectively **reduce the agricultural sector's carbon footprint**, while also **enhancing productivity** and **supporting market expansion** through environmentally sustainable practices.
- **Agricultural producers demonstrated a willingness to invest** in **training and capacity-building** activities aimed at improving their understanding and implementation of **carbon farming techniques**. They view education and hands-on support as key to successful adoption.

List of Policy Challenges and Needs Identified from the Survey and Interviews:

1. Knowledge and Awareness

- **Challenge:** Limited awareness and understanding of carbon farming among stakeholders, with around two-thirds of participants reporting only slight or moderate knowledge.
- **Need:** Development and implementation of comprehensive training programs on carbon farming practices, targeting farmers and stakeholders through agricultural extension services and educational institutions.

2. Training and Capacity Building

- **Challenge:** Lack of accessible and targeted education for farmers on sustainable practices and innovative agricultural technologies.
- **Need:** Structured and ongoing training initiatives provided by agricultural extension services, universities, and local organizations, focusing on the benefits and implementation of carbon farming.

3. Innovation and Research Integration

- **Challenge:** Insufficient integration of research outcomes into practical agricultural applications and limited access to expert guidance.
- **Need:** Strengthening the role of research and innovation in providing advisory services, developing pilot projects, and disseminating best practices and case studies related to carbon farming.

4. Policy Support and Reform

- **Challenge:** Perception that the current Common Agricultural Policy (CAP) requires revision to ensure fairness and sustainability. Concerns include increased production costs, competition from imports, and market uncertainties.
- **Need:** Policy reform aimed at enhancing the fairness and resilience of the CAP, ensuring better market protection, support mechanisms, and clarity for farmers.

5. Financial Incentives and Funding

- **Challenge:** Limited financial support mechanisms for implementing sustainable and carbon-friendly practices.
- **Need:** Increased access to funding through EU programs, national subsidies, and public-private partnerships to support the adoption of carbon farming technologies and practices.

6. Climate Adaptation and Sustainability

- **Challenge:** Climate change is perceived as the most pressing challenge for EU agriculture, followed by income stability for farmers and the need for rural development.
- **Need:** Policies that promote climate resilience, sustainable income models, and rural development while aligning with broader environmental goals.

7. Curriculum and Knowledge Modernization

- **Challenge:** Academic curricula in agricultural education do not adequately reflect contemporary practices and technologies.
- **Need:** Integration of updated, climate-smart agriculture content into academic programs to prepare future professionals for emerging challenges and innovations.

8. Stakeholder Engagement and Interest

- **Challenge:** While there is notable interest in carbon farming, practical implementation remains limited due to knowledge gaps and uncertain incentives.
- **Need:** Support frameworks that facilitate knowledge exchange, collaboration, and peer learning among farmers, researchers, and policymakers.

9. Market-Oriented Focus vs. Sustainability

- **Challenge:** Financial profitability and market expansion remain top priorities for farmers, often at the expense of sustainability goals.
- **Need:** Policy instruments that align economic incentives with environmental objectives, encouraging farmers to adopt carbon farming while maintaining profitability.

5.2 Policy Gap Categories

In the context of North Macedonia**,** using insights from the survey, interviews, and relevant literature review, the following policy gap categories can be outlined:

- **Education, Training, and Awareness**
    - **Low Awareness of Carbon Farming Practices and Limited Knowledge**

    In North Macedonia, the concept of carbon farming is still relatively new. Survey results show that a majority of respondents have only basic or moderate knowledge. This knowledge gap limits interest, understanding, and implementation of climate-smart practices.
    - **Inadequate Training Infrastructure and Lack of Practical Training Opportunities**

    There is a strong interest among farmers in receiving training, yet structured and accessible programs are lacking. The National Extension Agency and educational institutions need to play a more active role in delivering hands-on, locally adapted training on carbon farming methods.

- **Outdated Academic Curricula**

Academic representatives and literature both point out the need to modernize agricultural curricula in North Macedonia. Current programs do not fully address climate change, carbon sequestration, or sustainability, leaving future professionals underprepared.

- **Research and Innovation**
  - **Weak Link Between Research and Field Practice**

North Macedonia has active academic institutions and research centers, but their findings are not sufficiently reaching farmers. There is inadequate financial and structural support for research institutions to work directly with farmers. Stakeholders emphasized the need for applied research, demonstration farms, and practical case studies to guide real-world implementation.

  - **Lack of Stakeholder Integration**

Interviews revealed a disconnect between ministries, local authorities, research bodies, and farmers. Improved coordination and multi-actor collaboration are needed to ensure knowledge flows and policies are aligned with field realities.

  - **Innovation Needs for Climate Adaptation but Limited Incentives for Innovation Adoption**

The country faces visible climate-related impacts such as yield reduction, soil degradation, and water stress. Stakeholders believe that innovation in soil management and carbon sequestration can help counter these effects, but current policy support is insufficient. There is absence of a policy framework that encourages innovation adoption through subsidies or tax incentives.

- **Funding and Economic Support**
  - **Limited and Inaccessible Funding Mechanisms**

Farmers and other stakeholders highlighted a lack of clear, accessible funding streams for transitioning to sustainable practices. EU and national programs are seen as potential sources, but the application processes are often bureaucratic and poorly communicated. Often, the complex and inaccessible funding mechanisms that discourage smallholder participation.

  - **Challenges with CAP Alignment connected to Market Uncertainty and External Competition**

Though not an EU member, North Macedonia is aligning with CAP principles. However, farmers report that EU-derived policies contribute to increased production costs, competition with imports, and market uncertainty. Adaptation of these policies to the local context is urgently needed.

  - **Lack of Incentives for Climate-Smart Agriculture**

There are currently few financial incentives specifically targeting carbon farming or other forms of climate-smart agriculture in North Macedonia. Government and EU-aligned support programs must be designed to reward environmental performance and carbon sequestration efforts.

Table 5.1 Policy Gap categories (North Macedonia)

Gap Category	Description of Issue	Potential actions/solutions
Education, Training, and Awareness	- Limited awareness and understanding of carbon farming practices among farmers and stakeholders. - Training programs and educational content are outdated or lacking.	- Develop and implement structured training programs through extension services and universities. - Launch awareness campaigns. - Update academic curricula with climate-smart content.
Research and Innovation	- Weak linkage between research institutions and practical field application. - Farmers lack access to modern carbon farming technologies and localized best practices.	- Promote applied research and demonstration farms. - Foster partnerships between academia, farmers, and local governments. - Disseminate practical tools and case studies.
Funding and Economic Support	- Financial support is limited, and existing funding programs are often inaccessible or misaligned with the needs of small farmers.	- Simplify access to EU and national subsidies for sustainable practices. - Design incentive schemes rewarding carbon sequestration. - Support carbon credit pilot programs.

6 Mapping current policies, institutions and legislation in the context of Carbon Farming in Cyprus

6.1 Key National Authorities Responsible for Carbon Farming

Promoting carbon farming requires successful and continuous monitoring from various government agencies and legal bodies, so that the effort is unified and effective. The following section will map the current landscape of policies, institutions and legislation related to carbon farming in Cyprus. The key national authorities involved in this sector will be covered. The interdependence of the actors involved, plays a critical role for the successful adoption and promotion of carbon farming practices. Authorities designing agricultural and environmental policies and authorities responsible for financing and implementation will be explored, to identify institutional frameworks supporting carbon farming in Cyprus.

MARDE has several Departments directly involved in policies, laws and regulations relevant to carbon farming. In addition, the Ministry is a significant contributor to the National Energy and Climate Plans (NECP) together with the Ministry of Finance and the Ministry of Commerce and Energy. MARDE, in cooperation with other public bodies, implements policies and measures to increase carbon removals, particularly in the Land Use, Land Use Change and Forestry (LULUCF) sector, a key element for Cyprus' climate neutrality strategy. Complementary to that, MARDE is aiming to reduce greenhouse gas emissions in non- EU Emissions Trading System (ETS) sectors. This effort contributes to achieving national targets set under EU regulations, including the Effort Sharing Regulation (ESR). The ESR sets binding national emission targets for sectors not covered by the EU ETS, such as agriculture, transport, buildings, small industrial installations, and waste. A key tool for enhancing carbon removals and contributing to emission reductions in agriculture is the Common Agricultural Policy (CAP) Strategic Plan 2023-2027, for which MARDE is the Administrative Authority.[56]

- **Department of the Environment, MARDE**

The main objective of the Department of Environment (DoE) is to develop and implement environmental policies, including those related to nature, biodiversity and climate change. The National Climate Change Adaptation Strategy (NAS) and the National Climate Change Adaptation Action Plan (NAP) are under the umbrella of the Department, with the aim of coordinating relevant actions and updating these documents. The Department monitors the implementation and oversight of NAS and NAP, and is responsible for the progress of the plan’s objectives, preparing periodic reports for the Council of Ministers through the Minister of MARDE.[57]

- **Department of Agriculture, MARDE**

The main responsibility of the Department of Agriculture (DoA) is to design and implement policies aimed at developing and strengthening the competitiveness of the agricultural sector and reviving the countryside, while protecting the environment. Its specific functions related to environmental management include developing agricultural policies and practices, including those related to sustainable land management and soil health. DoA is directing the Measures within the Strategic Plan for Cyprus Common Agricultural Policy (CAP), offering a framework to incentivize farmers to adopt carbon farming principles through eco-schemes and agri-environmental measures.[58]

[56] Ministry of Agriculture, Rural Development and Environment. (2025). *Ministry of Agriculture, Rural Development and Environment*. Gov.cy.
[57] Department of Environment, Ministry of Agriculture, Rural Development and Environment. (2025). Available at https://www.moa.gov.cy/moa/environment/
[58] Department of Agriculture, Ministry of Agriculture, Rural Development and Environment. (2022). Available at: https://www.moa.gov.cy/moa/da/

- **Department of Forestry, MARDE**

The primary responsibility of the Forestry Department (DoF) is the sustainable management and protection of Cyprus's forests, with its specific tasks relating to environmental management and including the development of strategic plans to adapt Cyprus' forests to climate change and to address the increased risk of forest fires. The DoF also promotes research, data collection, and systematic monitoring of the effects of climate change on forests. It prepares and implements forest adaptation measures, such as thinning and reforestation. The DoF collaborates with relevant District Administrations and Local Authorities on fire protection outside state forests.[59]

- **Agricultural Research Institute (ARI)**

ARI (Carbonica partner) is identified as a leading research organization active in the area of agri-food and is conducting feasibility and theoretical research aimed at the rational increase of agricultural and livestock production and upgrading of product quality. Its specific functions related to environmental management include research on soil-water use and environment, as well as soil emissions and carbon farming.[60]

- **Water Development Department (WDD)**

The Water Development Department (WDD) is responsible for implementing water policy to ensure the sustainable use and management of water resources. The WDD is crucial for agriculture in Cyprus, which is highly sensitive to water availability. Its work on efficient irrigation systems and the potential use of desalinated water for irrigation are relevant to making agriculture more sustainable and supporting soil health by ensuring adequate and efficient water supply.[61]

- **Cyprus Agricultural Payments Organization**

The Cyprus Agricultural Payments Organization (CAPO) is the body responsible for the administrative and financial implementation of the European Union's Common Agricultural Policy (CAP) in Cyprus. Its main function involves the processing of applications and disbursement of payments to farmers and beneficiaries participating in the various CAP Interventions. CAPO manages the electronic submission system for agricultural payment applications, which is the primary method for applicants to submit their requests. The organization is tasked with safeguarding the Union's financial interests, which includes the authority to offset unduly paid amounts against future payments and the requirement to publish details of CAP beneficiaries. CAPO needs to approve in advance any new measures that will provide funding to farmers to ensure that eligibility checks and implementation inspections are feasible and practical.[62]

6.2 Analysis of National Policies and Regulatory Frameworks for Carbon Farming

This section will outline Cyprus strategic approach to adapting to and mitigating the impacts of climate change. Cyprus, an EU member since 2004, is dedicated to aligning its national policies with the European Union's environmental and climate ambitions, notably through initiatives such as the European Green Deal, which aims for climate neutrality across the EU by 2050. The purpose of this section is to introduce the Cyprus revised National Strategy on Adaptation to Climate Change (NAS), covering the period 2025 to 2050, which builds upon the initial 2017 Strategy. The overarching goal of this updated NAS is to strengthen the country's ability to withstand the impacts of climate change and to achieve climate resilience

[59] Department of Forests, Ministry of Agriculture, Rural Development and Environment. (2025). Available at: https://www.moa.gov.cy/moa/fd/
[60] Agricultural Research Institute, Ministry of Agriculture, Rural Development and Environment. (2025). Available at https://www.moa.gov.cy/moa/ari/
[61] Water Development Department, Ministry of Agriculture, Rural Development and Environment. (n.d.). Available at: https://www.moa.gov.cy/moa/wdd/
[62] Cyprus Agricultural Payments Organisation. (n.d.). Available at: https://www.capo.gov.cy/capo/

by the middle of the century. Among the key areas of focus within this strategy are those concerning Agriculture and Soil, which involve adapting agricultural practices to the changing climate, promoting sustainable land management, and addressing the growing challenge of water scarcity.
The following analysis will explore specific adaptation measures within the agricultural and soil sectors. This will include considering the role of the Common Agricultural Policy (CAP) Strategic Plan of Cyprus for 2023-2027, the potential for soil carbon sequestration in line with the Land Use, Land-Use Change, and Forestry (LULUCF) Regulation, and various efforts to encourage agri-environmental practices aimed at protecting and improving soil health.

Existing policies and regulations related to carbon farming

- **National Strategy on Adaptation to Climate Change (NAS) 2025-2050 (Department of the Environment, MARDE)**

This revised strategy, supported by the EU's Technical Support Instrument, outlines Cyprus' approach to building climate resilience. It includes strategic directions for the agriculture sector that involve adapting practices to changing conditions and governance frameworks. The strategy promotes sound land management practices and changes in soil use and cultivation methods, which can support the adoption of carbon farming, if not directly, indirectly. Measure “AGRI 3n” within this strategy proposes implementing cost-share programs, tax breaks, rebates, or low-interest loans to support farmers in adopting practices promoting soil health.
The National Strategy focuses on the importance of healthy and resilient soils and increased CO_2 storage capacity. This is identified as one of the soil related sectoral strategic directions supporting **Strategic Objective 1:** Natural ecosystem resilience. Strategic Objectives are underpinned by Strategic Directions (many of which are sectoral), and for each specific sector, there is a defined set of Sectoral Adaptation Measures. Under the same Strategic Objective 1 mentioned above, a key strategic direction related to soil is the promotion of sustainable management and protection of soils. This is aimed at achieving specific benefits, namely to increase water absorption capacity and protect against runoff. Another related direction under Objective 1 is to improve the soil water balance and reduce evaporation. The measures regarding the soil sector aim at addressing soil health, erosion, and degradation. For example, SOIL3 measure is promoting the practice of incorporating compost into agricultural soils to reduce desertification and degradation. The strategy explicitly states that increasing soil organic matter (SOM) through compost incorporation "contributes to soil carbon storage" and notes the added benefit of reducing methane emissions by diverting waste biomass from landfills (“Revision and Update of the National Strategy on Adaptation to Climate Change in Cyprus,” 2025).
The Strategy also aims to strengthen traditional and agro-ecological soil cultivation practices. These practices can increase soil organic matter (SOM) and contribute to carbon sequestration.[63]

- **National Adaptation Action Plan (NAP) within NAS**

The action plan addresses carbon farming through the lens of sustainable land management within the agricultural sector. Measures such as encouraging communities to adopt good land management practices and change cultivation methods are highlighted. Furthermore, the plan mentions promoting soil enrichment practices, the integration of compost to reduce desertification, and the installation of windbreaks to limit soil erosion. Building upon the encouragement for communities to adopt good land management practices and change cultivation methods (AGRI 3n), the NAP sets out clear steps and timelines for these actions. It includes detailed impact assessment fact sheets for each measure to guide prioritization and resource

[63] Department of Environment, Ministry of Agriculture, Rural Development and Environment. (2025). *National Strategy on Adaptation to Climate Change 2025 – 2050*. Republic of Cyprus

allocation. It is also supported by cross-sectoral measures within the NAP, including governance initiatives and educational programmes, such as those based on the National Action Plan for Environmental Education (NAPEESD), aimed at building capacity and promoting awareness among stakeholders, including farmers.
Consequently, the NAP outlines how implementation will be monitored, evaluated, and financed, with the DoE of MARDE coordinating the process and issuing biennial progress reports that will inform updates to the NAP. Thus this plan provides a structured framework for translating the broad goals of sustainable land management and carbon farming into concrete actions.[64]

- **CAP Strategic Plan of Cyprus 2023-2027 (MARDE)**

This plan, as the implementation of the EU's Common Agricultural Policy (CAP) in Cyprus, includes objectives directly relevant to climate change mitigation and adaptation, including the enhancement of carbon sequestration. The Plan is seen as a means to continue and increase interventions, particularly concerning soil management and addressing issues like increased soil erosion and desertification, by promoting agri-environmental measures. Furthermore, the plan aims to ensure that future CAP Strategic Plans fully utilize EU funding programmes for the adaptation of the agricultural sector to climate change. Pilot projects and detailed SWOT and Climate Risks and Vulnerability Assessment (CRVA) assessments will be developed within the framework of the next CAP Strategic Plan (2027 onwards) to ensure the sector can fully leverage EU funding. In addition, the work carried out in projects like CARBONICA, which assesses the suitability and financial viability of various carbon farming practices, is considered well-suited for development into eco-schemes and/or agri-environmental measures within this Strategic Plan.
Currently, the following measures are included in the Strategic Plan, including actions aiming at the sustainable development of the primary sector, specifically contributing to reducing greenhouse gas emissions, enhancing resilience, and improving resource efficiency. The Plan provides a framework through its eco-schemes and agri-environmental measures (AEMs) to incentivize farmers to adopt carbon farming principles via targeted financial support. Relevant Measures identified relevant to carbon farming, supported within the Cyprus CAP within AEMs and its actions include, crop rotation (A1.2), biodiversity protection (A1.3) and organic farming(A1.4).
Within the eco-schemes the Measures for the improvement of organic matter and soil quality (AP3.1) including incorporation of plant residues (Action B), compost application (Action C) and Measures to reduce the burden on soils and water (AP3.2), which includes simpler practices like the ban on herbicide use (Action B+C). However, the ban on herbicide use allows soil cultivation for weed management, which has a negative impact on carbon sequestration.[65]

- **Forestry**

Within the National Adaptation Strategy (NAS) a key adaptation measure for the forestry sector is the development and implementation of a Strategic Plan for adaptation of Cyprus forests to climate change. This plan is considered essential for ensuring the long-term health and sustainability of forests aiming to adapt forest ecosystems to climate change and enhance their contribution to climate change adaptation.[66]
Adding to the above, Cyprus has prepared and submitted its National Forestry Accounting Plan in accordance with Regulation (EU) 2018/841. The initial plan was submitted to the European Commission in 2018 and a revised version was submitted in December 2019. This plan focuses on accounting for GHG

[64] Department of Environment, Ministry of Agriculture, Rural Development and Environment. (2025). *National Climate Change Adaptation Action Plan 2025–2050: Adaptation measures impact assessment*. Republic of Cyprus.
[65] Cyprus Agricultural Payments Organisation. (n.d.). *Summary of the Common Agricultural Policy Strategic Plan* (2nd ed.). Republic of Cyprus
[66] Department of Environment, Ministry of Agriculture, Rural Development and Environment. (2025). *National Strategy on Adaptation to Climate Change 2025 – 2050*. Republic of Cyprus

emissions and removals from the LULUCF sector, particularly from Managed Forest Land, and includes the Forest Reference Level for Cyprus for the period 2021-2025.[67]

- **EU Biodiversity Strategy 2030**

The Strategy and Action Plan for Biodiversity in Cyprus is aligned with the 2030 EU Biodiversity Strategy. This alignment is crucial as biodiversity and climate mitigation and adaptation are inextricably linked, and the protection and restoration of Cyprus's unique biodiversity, encompassing flora, fauna, and marine ecosystems, is a strategic objective for enhancing the resilience of natural ecosystems against climate change. Climate change presents considerable challenges to the biodiversity and ecosystems. Increasing temperatures and altered precipitation patterns exert significant pressure on ecosystems, with biodiversity being primarily impacted by the rising frequency of wildfires, droughts, and reduced water availability. Promoting farming practices that benefit biodiversity, such as organic farming and agro-ecology, and establishing binding targets for restoring damaged ecosystems are central components of the EU Biodiversity Strategy 2030. The CAP Strategic Plan for Cyprus aims to contribute to halting and reversing biodiversity loss, improving ecosystem services, and conserving habitats and landscapes, partly through measures like afforestation and creation of forested areas, which also seek to boost biodiversity. [68]

National Energy and Climate Plan (NECP) 2021-2030

The National Energy and Climate Plan (NECP) 2021-2030 outlines Cyprus's commitment to increase CO_2 removals from the Land Use, Land Use Change and Forestry (LULUCF) sector to 352 kt CO_2 in 2030. This target represents an increase from a baseline of around 300 kt in previous years. Consequently, meeting this target is an important element of Cyprus' climate neutrality strategy. Both forestry and agriculture are considered crucial for achieving this LULUCF target. MARDE, in cooperation with other relevant bodies, is responsible for implementing policies and measures to improve CO_2 sequestration by the LULUCF sector. The increase in sequestration is planned to be covered by the agriculture and the forestry sector according to the following contributions:

<u>Forestry:</u>

- The Forests Department plans to provide 300,000 free seedlings per year by 2030 for the tree planting initiative.
- Afforestation is planned on state-owned land and the creation of new wooded areas is explicitly a measure.
- Regarding the reductions in emissions due to CO_2 absorption, the Ministry of Energy, Commerce and Industry (MECI) suggests that afforestation efforts will sequester approximately 2.5 kt CO_2 per year by 2030, starting at very low levels and increasing as trees grow.[69]

<u>Agriculture:</u>

- Increasing sequestration from land use involves incentive schemes with an approach which involves promoting carbon farming practices, for an increased carbon storage in soils and biomass.
- The development of a system for voluntary carbon markets based on the EU Carbon Removals and Certification Regulation (CRCF) is being considered. This is expected to provide financial incentives to farmers for implementing carbon farming practices, accelerating the creation of a voluntary market for carbon credits in agriculture.

[67] Department of Forests. (2025). *European Union and forests.*
[68] Department of Environment, Ministry of Agriculture, Rural Development and Environment. (2025). *National Strategy on Adaptation to Climate Change 2025 – 2050*. Republic of Cyprus
[69] Ministry of Energy, Commerce and Industry. (2024). *Cyprus – final updated national energy and climate plan 2021–2030* (v. 1.5). Republic of Cyprus

Furthermore, stakeholder consultations under the main issues raised during the public consultation of the draft NECP (2023-2024) recognised the need to protect agricultural land for carbon sequestration and promote compost production to improve soil health.

Long-term Low GHG Emission Development Strategy (LTS)

Complementary to the NECP, which sets the national targets and policies up to 2030, Cyprus also has its own Long-term Low GHG Emission Development Strategy (LTS). This strategy is aiming for zero net emissions by 2050 and recognises also the role of LULUCF absorptions in achieving this goal. Studies supporting the achievement of climate neutrality by 2050 for Cyprus were conducted in parallel with the drafting of the NECP, highlighting the close link between the two planning instruments. The LTS analyses scenarios for developing Cyprus' energy system and end-use consumption models, focusing on enhancing energy efficiency, increasing renewable energy, and promoting alternative fuels and technologies.[70]

From European Policy to National Action: Cyprus' Approach to Agricultural Sustainability Under the Green Deal and CAP

Cyprus is actively integrating the objectives of the EU Green Deal and the CAP into its national policies for agriculture and rural development. The revised NECP and the CAP Strategic Plan for 2023-2027 are key instruments in this mandatory alignment process. The ongoing revision of the NAP further demonstrates Cyprus' commitment to aligning with EU environmental and climate ambitions.

- **National Strategies and Commitments**

Cyprus has a clear national commitment to enhancing carbon sequestration in agriculture, notably under the LULUCF Regulation. This commitment drives several key national strategies and aligns with broader European Union objectives.

The NAS includes promoting biodiversity-friendly farming practices and enhancing organic farming, aligning with the EU's Biodiversity Strategy for 2030 and the Farm to Fork Strategy. There is a recognition of the crucial role of maintaining areas in good agricultural condition as a vital source of carbon sequestration. NAS and NECP emphasise the promotion of compost production and utilisation, identifying dual benefits in improved waste management and enhanced soil health. The interconnected strategies underscore Cyprus's dedication to leveraging the agricultural sector in achieving its climate goals.

- **Key Programmes and Initiatives**

Funding through HORIZON or HORIZON EUROPE projects, as well as national funding has / is being used to study carbon farming practices. The CARBONICA project directly addresses the EU's LULUCF Regulation's goal of increasing carbon sequestration in agricultural lands by evaluating carbon farming practices relevant to Cyprus, such as cover cropping and compost/biochar incorporation. Previous projects, such as the ECOWINERY project (Research and Innovation Foundation of Cyprus) addressed carbon sequestration in vineyards, through vines and margin vegetation. In addition, projects such as GreenCarbonCY are developing web-based support tools to model soil CO_2 fluxes and optimize carbon-farming practices in different crops of economic value. The "LIFE – AgrOassis: Regenerative approaches for building climate change resilience in EU agricultural regions prone to desertification" project includes actions that increase carbon sequestration, such as the planting of margin vegetation. The European Innovation Partnership (EIP) is being implemented through the RDP to help deliver innovative solutions to the farm sector, which can include carbon farming techniques.

The LEADER programme, administered by Local Action Groups (LAGs), can support local rural development projects that include initiatives related to sustainable agriculture.

[70] Department of Environment, Ministry of Agriculture, Rural Development and Environment. (2022). *Cyprus' long-term low GHG emission development strategy: 2022 update*. Republic of Cyprus.

- **Administrative and Policy Framework Alignment**

Efforts are being made to improve the reporting of emissions from agriculture through better data collection and the promotion of emission reduction opportunities with CAP support. Cyprus is considering the development of a reliable system for carbon removals through voluntary carbon markets, based on the principles of the EU Carbon Removals and Carbon Farming (CRCF) Regulation. [71]

Knowledge Transfer and Training

The CAP places a significant emphasis on supporting new generations of farmers through increased mentoring and knowledge transfer. This framework is designed to provide producers in Cyprus with relevant education and training, alongside advice and cooperation, to facilitate the uptake of new technologies within the primary sector. Specifically, expanding outreach and training initiatives can improve the adoption of underutilized carbon farming practices, highlighting the crucial role of education and knowledge dissemination, potentially even before financial incentives are considered. Furthermore, Cyprus is developing an action plan on 'Modern professional development for the green and digital transition', which aims to promote essential green skills. This broader national initiative underscores the focus on education as a key component in aligning with the objectives of the EU Green Deal.[72]

Reviewing available financial support for carbon farming at national level in Cyprus

The transition to carbon farming is being supported in Cyprus through various financial mechanisms, largely integrated within the framework of the Common Agricultural Policy (CAP) and national strategies. These mechanisms aim to incentivize farmers to adopt practices that enhance carbon sequestration and promote environmental sustainability.

National Subsidies and Government Support

- **Direct payments** for sustainable practices (**eco-schemes**) through the CAP Strategic Plan (2023–2027): The Cyprus CAP Strategic Plan dedicates a significant portion of its budget towards environmental and climate objectives and eco-schemes, with €66 million allocated for such objectives. Cyprus offers financial support to farmers through eco-schemes and agri-environmental measures (AEMs), some of which are relevant to carbon farming. These include measures such as crop rotation, compost application, and organic farming. These practices can contribute to increased carbon sequestration and improved soil health.
- Cyprus applies a **redistributive payment** for the first time, granting an additional €28 per hectare for the first 30 hectares of farms. This enhanced income support for small and medium-sized farms could encourage the adoption of diverse and sustainable farming practices.
- The ongoing **green tax reform in Cyprus,** included in the Recovery and Resilience Plan, will introduce carbon pricing in non-ETS sectors. While the reform is intended to be fiscally neutral, it could indirectly influence investment decisions and make carbon-reducing practices more economically attractive over time.[73]

National Carbon Removals System and private sector investments

As mentioned, Cyprus is considering developing a reliable system of removals through voluntary carbon markets, based on the principles of the EU CRCF Regulation

Complementary to the above, this includes:

[71] Ministry of Energy, Commerce and Industry. (2024). *Cyprus – final updated national energy and climate plan 2021–2030* (v. 1.5). Republic of Cyprus

[72] Ministry of Energy, Commerce and Industry. (2024). *Cyprus – final updated national energy and climate plan 2021–2030* (v. 1.5). Republic of Cyprus

[73] Cyprus Agricultural Payments Organisation. (n.d.). *Summary of the Common Agricultural Policy Strategic Plan* (2nd ed.). Republic of Cyprus

- Accreditation of methodologies for specific carbon removal and reduction practices.
- Developing an institutional framework for carbon market development and participation to allow producers to benefit from their absorption actions
- Designing, developing, and operating a national carbon registry to monitor progress and simplify compliance with international obligations.[74]

International Grants and Climate Finance

- **EU Funding**: Multiple EU funds support climate-related actions, including adaptation and mitigation in agriculture

These include:

- The LIFE Programme, which focuses on update and development of EU environmental and climate policy and legislation by co-financing projects with European added value.
- The Recovery and Resilience Facility (RRF) can provide funding for measures that contribute to the green transition.
- The Policy Program "THALIA 2021-2027" is strengthening climate management and sustainable practices.
- The European Regional Development Fund that can support spatial development projects with energy efficiency and decarburization dimension.

Table 6.1 Policy Landscape (Cyprus)

Policy/Program	Focus Area (Ex. Digital Ag, Carbon Sequestration)	Challenges
National Climate Strategy and National Action Plan	Carbon Sequestration	Limited public and institutional awareness; gaps in local implementation and monitoring.
Cyprus CAP Strategic Plan	Digital Agriculture & Carbon Sequestration	Lack of integrated digital solutions for farmers; insufficient alignment with climate goals.
Biodiversity Strategy	Carbon Sequestration	Poor integration of conservation goals with agricultural practices and land use.
National Energy and Climate Plan	Carbon Sequestration	Lack of quantified clear path towards increasing carbon sequestration
Green Finance Mechanisms	Digital Agriculture & Carbon Sequestration	Low awareness of available green finance; SMEs and farmers face barriers in accessing funds.

[74] Ministry of Energy, Commerce and Industry. (2024). *Cyprus – final updated national energy and climate plan 2021–2030* (v. 1.5). Republic of Cyprus

6.3 Smart Specialization Strategy in Relation to Carbon Farming

Cyprus' Smart Specialization Strategy (S3) for the period 2023-2030, is an update of its initial 2015 strategy. The objective of this strategy is to promote research, technological development, and innovation (R&I) as a key driver for Cyprus's economic growth, contributing to addressing key economic and social challenges and developing conditions for sustainable growth. This aligns with the principles outlined in the Europe 2020 strategic framework. The S3 aims to diversify the Cypriot economy into new, more complex activities, moving beyond a reliance on natural resources and embracing innovation. It acts as a guide for national funding programmes for research and innovation, which are designed and managed by the Research and Innovation Foundation (RIF). The strategy identifies priority areas where Cyprus has a competitive advantage or where R&I can address societal and economic challenges.[75]

Key Strategic Priorities

The Smart Specialization Strategy (S3) of Cyprus for 2023-2030 is organized in modules, in four priority areas which are the following:

- **Technological Priority Areas:**

Digital Technologies: Including high-performance computing, cybersecurity, digital tourism, and AI. These are seen as essential for developing applications across various sectors

Innovative Materials: Similar to digital technologies, these have broad applications across different sectors

- **Ecosystems**

Agri-food: Encompassing agriculture, livestock, aquaculture, and the food industry. Research aims to improve competitiveness and resilience, reduce the environmental footprint, create healthy food systems, and protect natural resources. Focus areas include diversifying competitiveness, supporting agroecology, and mitigating climate change impacts

Shipping: Focuses on decarburization, digital technologies for monitoring, and equipment for maritime applications

Renewable Energy Sources: The development of green technologies and resource efficiency are key aspects.

- **Emerging Priorities/Ecosystems**

Currently only includes the space sector

- **Enablers**

These areas support the other priorities and include Health and the Environment. The environment enabler focuses on adaptation to climate change, monitoring and protection from economic activities, greening industry, and management of natural resources and biodiversity

Relevance to Carbon Farming

Cyprus's S3 2023-2030 prioritizes the Agri-food ecosystem and the Environment enabler. This supports carbon farming by aiming for a more sustainable and climate-resilient agricultural sector. The strategy's focus on research and innovation provides a framework for developing and implementing carbon farming practices and technologies in Cyprus, aligning with broader EU Green Deal objectives.

The S3 priorities, within the Agri-food ecosystem, aim to support activities following the principles of agroecology to enhance the resilience and sustainability of the farming system and reduce its environmental footprint. This involves supporting activities aligned with agroecology principles and

[75] Deputy Ministry of Research, Innovation and Digital Policy. (2023, March 30). *Smart specialisation strategy 2023–2030*. Republic of Cyprus

developing circular economy applications for the re-use of agricultural, livestock, aquaculture, and food processing wastes. The strategy's focus also includes developing methods for improving food quality and safety from farm to fork and quantifying the effects of agriculture on the environment and developing mitigation methods. The strategy further underscores the potential for local producers to test and refine their products within the Cypriot market before venturing into international markets. Moreover, Cyprus has expressed a keen interest in participating in the Horizon Europe European Partnership "Accelerating farming systems transition: agroecology living labs and research infrastructures". The Environment enabler priority area also demonstrates relevance to carbon farming by including adjustment to climate change and the management of natural resources and protection of biodiversity

6.4 Implementation of the EU Digital Strategy at the National Level

General overview of National Digital Strategy

The Digital Strategy of Cyprus, outlines a vision and strategic objectives for the digital transformation of the Cypriot economy and society. The overarching aim is to leverage Information and Communication Technologies (ICT) as a catalyst for boosting economic competitiveness, creating high-value employment, modernizing the public sector, enhancing transparency, and improving the quality of life for citizens. The strategy identifies several strategic objectives, including connecting Cyprus through the development of robust fixed and wireless infrastructure and promoting competition in electronic communications, and modernizing public administration and providing e-government services to enhance efficiency, reduce bureaucracy, and improve interactions between the state, citizens, and businesses.

Key objectives involve ensuring the participation of all citizens in the digital Cyprus by cultivating digital literacy, strengthening human capital through education and training in ICT, fostering digital entrepreneurship by promoting e-commerce and providing incentives for businesses to adopt digital technologies, and promoting ecological technologies through intelligent transport and water management systems.[76]

Relations to Digital Agriculture and Carbon Farming

The strategy's aim to modernize existing important economic sectors implicitly includes agriculture. The focus on connecting Cyprus through improved broadband infrastructure is fundamental for enabling the adoption of digital agriculture technologies in rural areas, facilitating data collection, remote monitoring, and access to online resources. Additionally, the objective related to promoting ecological technologies supports the principles of sustainable agriculture. Action 17.7, which provides incentives for businesses to use environmentally friendly technologies and practices in their operations serves potentially as an extension to encourage the adoption of practices relevant to both digital agriculture and carbon farming. The ultimate goal of using ICT to address social challenges like climate change is to promote the efficient use of energy and the reduction of carbon dioxide.

[76] Deputy Ministry of Research, Innovation and Digital Policy. (2024). *Digital strategy 2020–2025*. Republic of Cyprus

7 Policy Gaps Analysis in the context of Carbon Farming with focus on Cyprus

7.1 Needs and Challenges for Carbon Farming

The study undertaken as part of the CARBONICA project (Deliverable D1.1) involved thorough surveys and engagement with stakeholders to evaluate the preparedness for carbon sequestration agriculture within Cyprus. The assessment included 55 Cypriot participants, with a diverse representation from key sectors: 24 farmers (43.6%), 9 academics (16.4%), 5 NGO representatives (9.1%), 3 policymakers (5.5%), and 14 individuals from environmental services and industry (25.4%). This report pinpoints essential policy considerations that are specific to the Mediterranean agricultural context of Cyprus.

Key Survey Findings with Policy Relevance:

- Cypriot participants expressed a strong interest in agricultural innovations. The participants underscored the importance of solutions that enhance both productivity and environmental resilience, with several specifically noting the transformative potential of smart irrigation systems for improved water management practices. The focus of CAP on addressing water management as a main challenge and supporting investments in more efficient irrigation systems comes and cups this statement. NAS also emphasizes improving efficiency in water reuse and promoting research on the effects of climate change on agriculture.
- Financial viability is a dominant priority for agricultural engagement among Cypriot stakeholders, with market expansion and cost reduction frequently cited as critical objectives. Environmental goals are acknowledged, but they are often considered in relation to long-term economic sustainability rather than as standalone priorities.
- Despite the enthusiasm for soil carbon sequestration methods, participants reported limited actual practical experience with these measurement techniques. Farmers in particular expressed skepticism about the economic viability of such carbon farming practices, especially in cases without prior guaranteed prices or certification schemes.
- The need for the establishment of regional innovation hubs that would integrate academic research, the practical experience of farmers, and input from policymakers was identified. The model proposed has as an objective to prioritize hands-on training, moving beyond theoretical workshops to place a significant emphasis on demonstration farms that actively showcase effective carbon sequestration techniques.
- There was a strong acknowledgement regarding national subsidies were generally perceived as complementary to EU funding but insufficient on their own to drive widespread technology adoption. To effectively integrate innovative solutions, particularly in areas like precision agriculture, stakeholders believed that private-sector partnerships would be essential.
- The eco-schemes and agri-environmental measures (AEMs) within the Cyprus CAP could potentially support the activities of these innovation hubs and the demonstration of carbon farming practices like crop rotation, compost application, and organic farming.
- The mixed initial uptake of some of these measures underscores the importance of the practical, hands-on approach advocated by stakeholders within the regional innovation hub model.

Key Interview Findings with Policy Relevance

Reflecting the insights gathered from Cypriot stakeholders, there is a clear emphasis on the need for CAP reforms tailored to the specific circumstances of smallholder farmers, who reportedly face disproportionate administrative burdens that can significantly diminish the value of subsidies. Stakeholders identified water-efficient technologies as crucial for climate adaptation in Cyprus, with a strong endorsement for smart irrigation systems, although cost barriers remain a significant obstacle. Policymakers have also highlighted gaps in the existing carbon certification frameworks, advocating for the development of EU-aligned but Cyprus-specific systems to capitalize on the advantages of Mediterranean crops. Farmers themselves voiced strong concerns about economic viability, urging CAP revisions that can effectively balance environmental sustainability goals with the pressures of import competition. A recurring and widely supported recommendation was the establishment of collaborative platforms that bring together academic research, the practical experience of farmers, and policy input. This is seen as a vital step to address the fragmented knowledge landscape and the complexities associated with land ownership issues in Cyprus.

List of Policy Challenges and Needs Identified from the Survey and Interviews:

- **Smart Technology Adoption**

Challenge: Farmers cite prohibitive upfront costs for smart irrigation systems despite recognizing their water-saving potential.
Need: Subsidy programs paired with maintenance training networks to achieve water-use reduction targets.

- **Knowledge and Awareness**

Challenge: Cypriot stakeholders self-reported as "moderately informed" about carbon farming with only few having hands-on experience with agriculture tools. Farmers particularly emphasized gaps in practical application knowledge despite high theoretical interest.
Need: Establish a National Program under CAP delivering training, exploiting the expertise of academic experts with on-farm demonstrations.

- **Innovation and Research Integration**

Challenge: Academics noted poor adoption of GIS tools due to lack of farmer-friendly interfaces.
Need: Applied Innovation Hubs at regional levels to convert research into field-ready solutions, prioritizing crop adaptations.

- **Stakeholder Engagement and Interest**

Challenge: While many participants expressed carbon farming interest, it seems like a few would prioritize surviving import competition over sustainability investments.
Need: Develop a certification system with EU-aligned standard but with Cyprus specific metrics, enabling premium pricing.

- **Economic Viability and Financial Incentives**

Challenge: Farmers have expressed skepticism about the economic viability of carbon farming without sustainable guaranteed subsidies. The current funding mechanisms through CAP eco-schemes and agri-environmental measures may not always adequately address these concerns
Need: Refinement of the CAP Strategic Plan offering evidence-based financial support, with strategic reallocation of resources towards successful and practical interventions

- **Soil Health and Sustainable Land Management**

Challenge: Promoting sound land management practices, changing cultivation methods, are identified as important for soil improvement and carbon sequestration.
Need: A community-based Soil Health Program with education, incentives, and partnerships is proposed to fill this gap.

7.2 Policy Gap Categories

- **Education, Training, and Awareness**

The under-performance of specific ecological schemes aiming at improving soil quality and nutrient management under the CAP, has been partly attributed to limited time for producer information and difficulties in accessing certified seeds. This fact can be supported by the answers in the above surveys, indicating a gap in effectively educating farmers about the benefits and requirements of such schemes, as well as ensuring they have access to the necessary resources and knowledge to implement these carbon farming practices.

- **Research and Innovation**

In the Cypriot context, while there's enthusiasm for soil carbon sequestration methods, participants reported limited practical experience with measurement techniques. This indicates a need for more applied research and innovation in carbon farming practices, particularly in areas like measurement and verification, and aligns with the CAP's aim to foster innovation, knowledge transfer, cooperation and implement the European Innovation Partnership.

- **Funding and Economic Support**

Farmers have expressed concerns regarding the financial practicality of adopting carbon farming methods due to rising production costs and competition from exports. CAP current funding mechanisms may not sufficiently address farmers' worries about economic viability and the feasibility of implementation. However, it does address strongly agricultural practices and the modernization of farms but has limitations due to mixed performance of different sub-measures underscores the need for carefully designed and targeted support for carbon farming initiatives. Looking ahead, the potential development of voluntary carbon markets in Cyprus, grounded in the principles of the EU Carbon Removals and Carbon Farming (CRCF) Regulation, could provide future economic incentives for farmers to engage in carbon sequestration practices. Cyprus is actively considering the establishment of such a system, including the accreditation of methodologies for carbon removal, the development of an institutional framework, and a national carbon registry (NECP).

- **Challenges with CAP Alignment**

The Cyprus CAP prioritizes small and medium-sized farms but tries to improve farm competitiveness but indeed practical implementation for smaller farms in carbon farming remains challenging. More specifically, smallholder farmers have criticized the CAP's "one-size-fits-all" approach and the disproportionate administrative burden and the success of simpler, lower-funded actions over more complex, highly funded ones suggests that the current CAP structure may not be fully aligned with the realities and capacities of Cypriot farms facing market uncertainties and external competition. The need for private-sector partnerships for technology adoption further highlights that CAP support alone may be insufficient to drive necessary changes in the face of these external pressures.
The analysis of CAP also revealed that the higher uptake of the simpler measures e.g. herbicide ban compared to the more complex e.g. soil improvement (compost) is attributed to difficulties in producer information, highlighting a misalignment with its scope.

Table 7.1 Policy Gap categories (Cyprus)

Gap Category	Description of Issue	Potential actions/Solutions
Funding & Incentives	Limited availability of grants and financial support for the adoption of AgriTech and digital solutions.	Introduce targeted funding programs and subsidies to support digital transformation in agriculture; simplify grant procedures.
Technical Training	Lack of capacity-building programs for farmers and stakeholders to use and maintain new digital technologies.	Establish training centers and e-learning platforms through extension services; involve universities and tech providers.
Carbon Credit Market	Absence of a structured system that allows farmers to benefit from carbon sequestration and trading schemes.	Develop a national carbon credit framework; link with EU and global carbon markets; support pilot programs for carbon farming

8 The Role of the EU Carbon Removal Certification Framework (CRCF)

The upcoming **EU Carbon Removal Certification Framework (CRCF)** is a major policy initiative that will directly affect the design and implementation of carbon farming schemes across Europe. Adopted by the European Parliament and the Council in 2024, the CRCF aims to provide a unified, transparent, and science-based system for the **certification of carbon removals**, including those achieved through agricultural practices. In the context of **CARBONICA's three widening countries (Greece, North Macedonia, and Cyprus)**, the CRCF presents both an opportunity and a challenge. On one hand, it introduces a formal mechanism for validating the climate impact of land-based practices, including soil carbon sequestration and agroforestry. On the other hand, its implementation demands significant technical, institutional, and data-related capacities that are still under development in the region.

Core Features of the CRCF Relevant to Carbon Farming

- **Standardised certification methodologies** for soil carbon sequestration, biochar, peatland rewetting, and agroforestry.
- **MRV (Monitoring, Reporting and Verification) requirements** to ensure permanence, additionality, and environmental integrity of carbon removals.
- **Third-party verification and EU registry** to track certified removals and avoid double-counting.
- Emphasis on **co-benefits**, such as biodiversity and social sustainability, especially for nature-based solutions like carbon farming.

These criteria will determine eligibility for future participation in **voluntary carbon markets**, integration into national climate strategies, or linkage with **CAP eco-schemes** and climate results-based payments.

Strategic Relevance for CARBONICA

CARBONICA's emphasis on **carbon farming protocols**, field validation, and stakeholder engagement through the **Excellence Hub and Multi-Actor Platforms (MAPs)** aligns well with the direction set by the CRCF. However, to maximise impact, the following actions are recommended:

- **Capacity building** of national authorities, extension services, and certification bodies to implement CRCF-compliant MRV protocols.
- Early **piloting of CRCF methodologies** on selected crops and land uses across the three countries, leveraging CARBONICA's pilot sites and lab prototypes.
- Alignment of CARBONICA's **Guide of CF Solutions** and policy recommendations with the CRCF technical documentation and sustainability criteria.

Implications for Policy Planning

Integrating the CRCF into national strategies will require cross-ministerial coordination, particularly between agricultural, environmental, and climate authorities. Greece, Cyprus, and North Macedonia should initiate preparatory dialogues to:

- Identify **data gaps and infrastructure needs** for CRCF-compliant certification (e.g. soil carbon baselines, satellite verification, registries).
- Develop **legal pathways** to incorporate certified removals into National Energy and Climate Plans (NECPs) and Smart Specialization Strategies (S3).
- Consider incentives for **early adopters** (e.g. farmers and cooperatives) willing to comply with CRCF standards.

In this context, CARBONICA can serve as a testbed for CRCF adaptation in widening regions, contributing to both **technical readiness** and **regional policy cohesion**.

9 Cross-country Synthesis of Policy Gaps in Carbon Farming

This section presents a comparative overview of policy gaps across Greece, North Macedonia, and Cyprus based on the analysis conducted in previous chapters. It identifies common challenges, country-specific observations, and offers strategic recommendations to support regional policy coherence in carbon farming.

Table 9.1 Common Challenges Across All Three Countries

Category	Shared Gap	Implication
Policy Recognition	Lack of formal recognition of carbon farming in national law or CAP plans	Limits funding and tailored support
Incentive Mechanisms	No results-based payment schemes for carbon sequestration practices	Discourages farmer uptake
MRV Capacity	Underdeveloped MRV systems	Hinders carbon market participation
Training and Advisory Services	Carbon farming not integrated into advisory or training programs	Slows adoption of practices
S3 Alignment	S3 strategies do not explicitly prioritize carbon farming	Missed regional innovation funding opportunities

Table 9.2 Country-specific Observations

Country	Notable Strength	Notable Weakness
Greece	Climate Law 4936/2022 mandates carbon budgeting	Fragmented coordination between agricultural and climate authorities
North Macedonia	Strategic alignment in climate and agriculture plans	Weak institutional capacity and lack of CAP-aligned tools
Cyprus	Environmental targets in CAP Strategic Plan 2023–2027	Low stakeholder awareness and technical capacity

Strategic Recommendations for Regional Policy Coherence

1. Initiate regional dialogue to harmonize MRV approaches and support CRCF readiness across all three countries.
2. Develop a shared policy roadmap that includes joint capacity building, pilot schemes, and monitoring protocols.
3. Coordinate updates to S3 strategies to embed carbon farming under climate-smart agriculture objectives.
4. Facilitate cross-border knowledge exchange through the CARBONICA MAPs and e-learning platforms, aligning advisory content and tools.

10 Policy Master Classes in Carbonica project

10.1 Objective and scope

The Policy Masterclasses within the CARBONICA project aim at fostering multi-actor dialogue and co-creation of policy solutions to enable the uptake of carbon farming practices in the three widening countries—Greece, North Macedonia and Cyprus.

The Policy Masterclass will be organized at national-level as one-day workshops bringing together relevant policy stakeholders, institutional representatives, researchers, and practitioners. The primary goal is to **present, test, and validate the policy findings and recommendations** developed through the project's policy landscape and gap analysis. This process is aligned with CARBONICA's mission to build a regional innovation ecosystem for low-carbon agriculture through evidence-based policymaking and stakeholder empowerment.

The Policy Masterclasses will serve as a structured engagement platform for:

- Presenting the national policy analysis findings;
- Facilitating moderated discussions around key challenges, gaps, and potential reforms;
- Collecting feedback to refine recommendations and promote shared ownership;
- Strengthening cross-sectoral linkages between agriculture, climate, digitalisation, and rural development domains.

Each workshop will be tailored to the national context and involves:

- Representatives from Ministries of Agriculture, Environment, and Digitalisation;
- CAP Managing Authorities and Paying Agencies;
- Researchers, advisory bodies, farmers' organisations, and NGOs;
- Technology and digital innovation stakeholders.

10.2 Methodology and Reporting

Methodology

The Policy Masterclasses are designed using a structured, participatory, and deliberative methodology. The process can be organized into the following key stages:

- **Overview of Policy Landscape and Gaps** – A brief presentation summarizing the main findings from the national analyses.
- Thematic Breakout Discussions – Targeted group sessions addressing critical areas such as policy coherence, institutional collaboration, monitoring and verification (MRV), financial support mechanisms, and digital infrastructure.
- **Stakeholder Validation Session**– An interactive session where participants jointly assess and refine draft policy recommendations using facilitation tools (e.g. policy cards, live polling, and SWOT analysis).
    - Policy Cards - Policy cards are structured prompts or summaries of proposed policy actions used during workshops to guide discussion and validation. Each card typically includes a policy recommendation, its objective, target stakeholders, expected outcomes, and implementation considerations. Participants can review, prioritize, modify, or add to the cards, making them a practical tool for co-creation and consensus building.
    - Live Polling - Live polling involves real-time voting by participants—usually via digital tools or mobile apps—during workshops or meetings. It is used to quickly gather opinions,

prioritize options, or test agreement on specific proposals. Live polling encourages inclusive engagement, enhances transparency in group preferences, and helps facilitators steer the discussion based on immediate feedback.
    - SWOT Analysis (Strengths, Weaknesses, Opportunities, Threats). It is a strategic tool used to evaluate the internal and external factors that may influence the success of a policy or action. In the context of policy masterclasses, stakeholders use SWOT to analyze a proposed recommendation, helping to surface potential enablers and risks, and to refine the approach for better feasibility and impact.
- **Synthesis and Next Steps** – A concluding plenary that consolidates the insights gathered and defines follow-up actions for national and regional policy development.

The Policy Masterclasses will only serve as a validation mechanism, but also as a capacity-building and networking instrument to mobilize long-term collaboration for the implementation of carbon farming policies across the region.

Reporting and follow up

The Policy Masterclass Workshop Report tentative structure is given in Annex 1.
The Policy Masterclass Reports will provide a structured presentation of the outcomes of each national workshop and will serve as a foundation for the next White papers dedicated to each country GR, MK, CY. This papers will include analysis of the Capacity for reforms or the enabling environment, and the Tailored policy recommendations derived from the gap analysis and co-created with policy makers, discussed and validated in policy master classes.

Each Policy Masterclass will also produce a national policy brief (discussion paper) summarizing:
- Key discussion outcomes;
- Stakeholder-validated policy recommendations;
- Context-specific actions and institutional commitments.

These briefs will feed into:
- A consolidated transnational synthesis report or Deliverable 5.5.
- Further dissemination through digital platforms and advocacy channels on national and EU level.

Policy Masterclass workshop proposed Agenda:
Carbonica Project – Strengthening Policy Frameworks for Carbon Farming **(**Multi Stakeholder approach in co-creation)
- Participants: 20
- Timeframe: October 2025-February 2026

Time	Session	Details
09:30 – 10:00	Registration	List of participants
10:00 – 10:15	Welcome & Introductions	Overview of the Carbonica Project and objectives
10:15 – 11:00	Presentation	MAPs, pilots, policy needs in carbon farming
11:00 – 12:00	Policy Dialogue	Discussion on identified policy gaps and need/challenges (validation)
12:00 – 12:30	Break	Coffee and refreshments
12:30 – 13:30	Exercise - Solution Development & Action Planning	Co-creating policy recommendations/solutions
13:30 – 14:30	Discussion	Defining next steps and responsibilities
14:30 – 15:00	Closing Remarks	Summary

- Presentation (project, MAPs, pilots, policy needs)
- Policy Discussion about identified policy gaps and needs/challenges

Exercise: Solution Development & Action Planning
Objective: Co-develop concrete recommendations and next steps

Proposed Solution (Examples)	Who is Responsible?	Resources Needed
Implement farmer training on digital tools	Ministry of Agriculture, Universities	Funding, Trainers
Develop financial incentives for carbon sequestration practices	Government, Private Sector	Grants, Certification
Create a digital agriculture data-sharing platform	Tech Companies, Farmers, Research Institutes	Infrastructure, Policy Framework

Potential Discussion topics:

- Which policy actions will create the most impact?
- Which are most feasible in the short term?
- Who needs to take responsibility for implementation?
- What funding sources can be leveraged?
- What partnerships can strengthen policy success?

11 Conclusion

Carbon farming represents a transformative opportunity to reduce greenhouse gas emissions, enhance soil health, and contribute to the European Green Deal and Common Agricultural Policy (CAP) goals. However, its widespread adoption depends on the existence of enabling policies, financial incentives, digital infrastructure, and institutional capacities.
This white paper examines the national policy landscapes and institutional frameworks relevant to carbon farming in three CARBONICA widening countries: **Greece, North Macedonia, and Cyprus**. It identifies policy strengths, bottlenecks, and key gaps that may hinder the adoption of low-carbon practices in agriculture.

The analysis reveals that while all three countries demonstrate political alignment with EU climate and agriculture goals, there is a significant implementation gap and the operationalization of carbon farming remains limited and fragmented. In all three countries, the Ministries of Agriculture and Environment serve as the primary authorities shaping agricultural and climate policy. However, institutional coordination is weak, particularly in linking agricultural digitalization, environmental protection, and climate action. In North Macedonia, several sectoral strategies remain disconnected, while in Cyprus and Greece, overlapping mandates slow integrated action.
National Strategies incorporate elements that support sustainability, but do not explicitly recognize carbon farming as a distinct or incentivized approach. Additionally, digital readiness for monitoring, reporting, and verification (MRV) of carbon sequestration remains limited, especially in terms of coordination between ministries and technical institutions.

Key findings include:

- Greece shows policy ambition in sustainability and digitalization but lacks integration of carbon farming in Smart Specialization Strategies and CAP implementation.
- North Macedonia, as a non-EU country, demonstrates proactive steps in climate strategy and agri-digital development, but faces systemic challenges in institutional capacity, data interoperability, and policy enforcement.
- Cyprus has climate and soil management goals embedded in policy documents but suffers from limited MRV capabilities and stakeholder awareness.

However, carbon farming is not clearly defined or incentivized as a policy category in any of the three countries. Major challenges across the countries include:

- Lack of technical capacity and infrastructure for monitoring, reporting, and verification (MRV) of soil carbon sequestration;
- Limited awareness and engagement among farmers and local authorities on the potential of carbon farming;
- Insufficient financial and market incentives, such as carbon credits or results-based payments, to encourage adoption of carbon farming practices;
- Underdeveloped digital ecosystems to support data collection and integration across sectors.

The paper identifies policy gaps across five dimensions: (1) explicit policy recognition of carbon farming, (2) cross-sectoral governance and stakeholder coordination, (3) financial and market incentives, (4) digital infrastructure for MRV, and (5) integration with national Smart Specialization Strategies.

To address these challenges, the paper proposes targeted policy recommendations that include:

- Developing national carbon farming roadmaps aligned with CAP and EU Green Deal objectives;
- Strengthening cross-ministerial coordination and stakeholder platforms for co-creation of carbon farming strategies;
- Enhancing digital MRV infrastructure and capacity-building across public institutions and the farming sector;
- Promoting pilot initiatives and demonstration projects to accelerate learning and investment.

In summary, while each country presents a unique context, they share common needs for clearer policy frameworks, stronger governance structures, improved technical capacities, and better alignment with EU strategic objectives. Addressing these challenges through transnational cooperation, knowledge exchange, and innovation support is essential for accelerating the adoption of carbon farming across the region.

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13 Annex

13.1 Annex 1 Policy Masterclass Report Structure

Masterclass Summary

- Date
- Location/Venue
- Organized by
- Number of participants and affiliations

Policy Discussion

- Key Discussion Points
- Validated Policy Gaps and Needs/Challenges

Policy Recommendations

- Co-Developed Policy actions

Conclusion

Appendices

- List of participants
- Photos