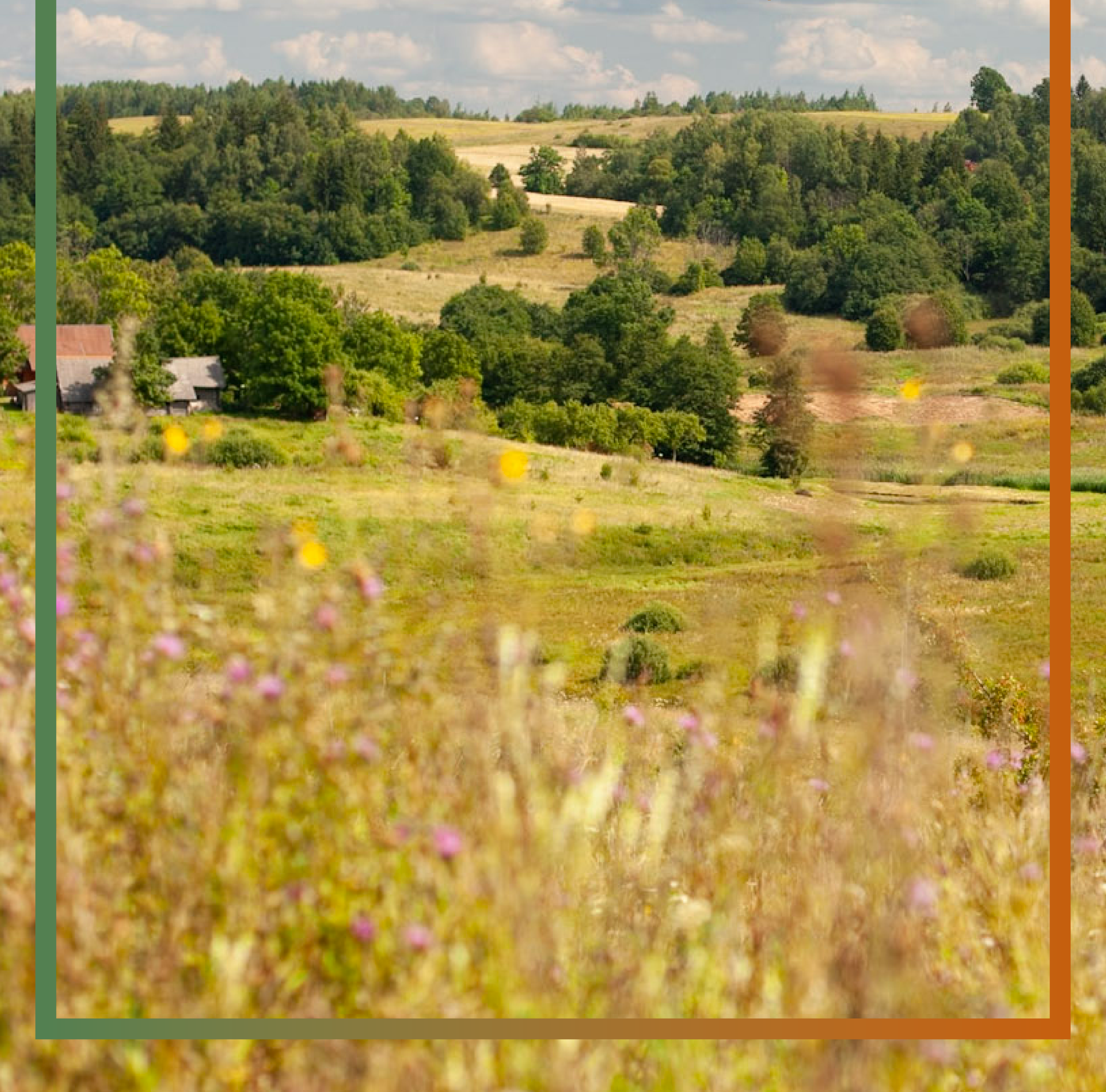
Towards climate friendly and resilient agri-food systems in Central Eastern Europe

The role of agroecological practices, sustainable diets, and holistic policies



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AKIS	Agriculture Knowledge and Innovation System
ANC	Natural or other area-specific constraints
ASD	Area-specific disadvantages resulting from certain mandatory requirements
BISS	Basic Income Support
CAP	Common Agricultural Policy
CSP	CAP Strategic Plan
CEE	Central Eastern Europe
CIS	Coupled income support
CIS-YF	Complementary income support for young farmers
COOP	Cooperation
CRISS	Complementary redistributive income support for sustainability
EAFRD	European Agricultural Fund for Rural Development
EAGF	European Agriculture Guarantee Fund
Eco-scheme	Schemes for the climate, the environment and animal welfare
ENRD	European Network for Rural Development
ENVCLIM	Environmental, climate-related and other management commitments - AECC
ESR	Effort Sharing Regulation
ESPG	Environmental Sensitive Permanent Grassland
EU	European Union
EU-16	EU Member States outside of CEE
EU-27	All EU Member States
EURAF	European Agroforestry Association
GAEC	Good agricultural and environmental conditions
GHGs	Greenhouse Gases
INVEST	Investments, including investments in irrigation
INSTAL	Setting up of young farmers and new farmers and rural business start-up
KNOW	Knowledge exchange and dissemination of information
LSU	Livestock Unit
LULUCF	Land use, land use change and forestry
NECP	National energy and climate plans

OHC	Out-of-Home Catering
OI	Output Indicator
RI	Result Indicator
RISK	Risk management tools
UAA	Utilised Agricultural Area

Abstract

Agriculture in the EU accounts for approximately 13% of greenhouse gas (GHG) emissions. Globally, the agri-food system is responsible for nearly a third of global emissions. Agriculture and food consumption are key drivers of biodiversity decline, environmental degradation and health costs associated with the currently dominant diets. There is a growing recognition and consensus that we urgently need to improve the sustainability of agri-food systems to address these multiple and interconnected crises.

This report aims to provide inspiration and offer a framing for stakeholders in Central Eastern European (CEE) countries to pursue a more holistic and coordinated approach for transitioning towards climate friendly and resilient agri-food systems. Drawing on mixed methods, including literature analysis, interviews with national experts and stakeholders, and policy analysis, the report highlights the building blocks for this transition: 1) a greater reliance on agroecological practices and nature-based solutions (including organic farming, agroforestry, peatland rewetting and sustainable livestock production), 2) a shift to sustainable diets, and 3) a reduction in food waste. The report provides an analysis of how the CEE countries are currently using the main policy instruments at their disposal - the Common Agricultural Policy (CAP) and the National Energy and Climate Plans (NECPs) - to support the sustainability transition in agri-food systems and identifies gaps and recommendations for their improvement. Moreover, drawing on available literature and good examples of designing food policies, the report provides an overview of policy tools that countries can use to speed up the process of moving towards more sustainable food consumption.

The 11 CEE countries – Bulgaria, Croatia, Czechia, Hungary, Estonia, Latvia, Lithuania, Poland, Romania, Slovakia, and Slovenia – share historical and socio-economic similarities, but also challenges and opportunities that distinguish them from non-CEE countries.

The analysis reveals that the CAP, despite its significant budget, continues to have limited positive impact for climate mitigation and adaptation in CEE countries and could be much better utilised to support the transition. Similarly, NECPs in CEE countries do not reflect sufficient ambition for agriculture and land management, and hardly address dietary changes.

A step change is needed to increase the ambition of the CAP and NECPs and develop holistic and synergistic policies. Key recommendations are outlined for strengthening the CAP and NECPs, and for promoting a coordinated and systemic approach that integrates production and consumption changes, supported by improved institutional capacities, research, and advisory frameworks. On the production side, policymakers must address farmers' dwindling economic position in the agri-food supply chains, lacking incentives to take up alternative ways of farming, as well as knowledge, tailored advice, and research needed to support farmers in making the transition. On the consumption side, coordinated food strategies, dietary guidelines, support for sustainable public procurement and development of markets for organic foods and plant-based foods are some key instruments to support the transition.

Finally, the report calls for setting clear goals, building societal support, coordination, and capacities to facilitate the wider transition towards climate friendly and resilient agri-food systems in CEE countries.

Executive Summary

Agriculture in the EU accounts for approximately 13% of greenhouse gas (GHG) emissions. Globally, the agri-food system is responsible for nearly a third of global emissions. Agriculture and food consumption are key drivers of biodiversity decline, environmental degradation and health costs associated with the currently dominant diets. There is a growing recognition and consensus that we urgently need to improve the sustainability of agri-food systems to address these multiple and interconnected crises.

The **11 countries in Central Eastern Europe** (CEE) – Bulgaria, Croatia, Czechia, Hungary, Estonia, Latvia, Lithuania, Poland Romania, Slovakia, Slovenia – account for approximately a third of the total agricultural land and 23% of the EU agricultural emissions. The countries of the CEE region share historical and socio-economic similarities, but also challenges and opportunities that distinguish them from non-CEE countries. Yet, there has been too little focus on these specificities, either in policy design or in critical analyses of EU agri-food policies. This report is motivated by the recognition that these specificities are important and efforts are needed to develop bottom-up capacities to enable the transition to climate friendly and resilient agri-food systems in CEE countries.

There is a considerable **dominance of a productivist agenda in CEE countries**, with the agricultural discourse primarily focused on the need to increase competitiveness, productivity, and efficiency and these goals are often seen in direct conflict with biodiversity, environment, or climate goals. The agricultural sectors have a higher share of smallholder and semi-subsistence agriculture compared to non-CEE countries, civil society initiatives around systemic issues in agri-food sector are mostly absent, and research and advisory capacites to support the knowledge - intensive agroecological practices or integrated agri-food system transition are limited. The increasing awareness of climate impacts presents an opportunity to prioritize a more integrated agri-food system perspective and a shift towards the paradigm where 'sustainability and agroecological practices are basic elements of competitiveness and resilience'. Numerous initiatives have emerged recently that begin to support this shift. However, much more **capacity and coordination are required**, within civil society, research and public administrations to drive the synergistic agenda at a faster pace. Currently, there is limited funding available for developing this capacity.

Against this background, this report aims to provide inspiration and offer a framing for stakeholders to pursue **a more holistic and coordinated approach for transitioning towards climate friendly and resilient agri-food systems in CEE countries**. The report draws on mixed methods, including literature analysis, analysis of policy documents, as well as interviews and online meetings with national experts and stakeholders.

As a starting point, the report provides an overview of climate mitigation and adaptation needs in relation to agri-food systems in CEE countries, and the building blocks for sustainability transition and their benefits: agroecological practices, including organic farming, agroforestry and peatland rewetting, sustainable diets, and reduced food waste.

The central focus of the report is the analysis of how the CEE countries are currently using the main policy instruments at their disposal - the **Common Agricultural Policy** (CAP) and the **National Energy and Climate Plans** (NECPs) - to support the sustainability transition in agri-food systems. A review of activities around sustainable food consumption was out of the scope of the report, but based on expert inputs we can say that there are increasing bottom-up and also national activities in this area that however remain limited and fragmented.

Based on the analysis of the CAP strategic plans (CSPs) and the draft NECPs available by early 2024, the report identifies gaps and provides recommendations for how countries can better use these policies to support the transition towards climate friendly and resilient agri-food systems (Chapters 4 and 5). Moreover, drawing on available literature and good examples of designing food policies, Chapter 6 provides an overview of various policy tools that countries can use to speed up the process of moving towards more sustainable food consumption.

Mitigation and adaptation needs in CEE countries

Following the collapse of socialism, the cumulative greenhouse gas emissions in CEE countries dropped significantly during the 1990s, decreasing by up to 45%. These reductions were driven largely by the shrinking livestock numbers, collapse of large scale collective farms, and reductions in N-fertilisers. Total emissions continued to decrease until 2010, but since then show a slight upward trend so that **current agriculture emissions for the region are largely the same as in year 2000**. The carbon stocks, i.e. carbon stored in soils and in above ground biomass have decreased significantly since 2010, albeit to a lower degree then in EU27. This is reflective of increasing climate impacts, including damage to forests through bark beetle infestations and extreme events, such as fires and ice storms. In addition to **extreme events**, the continued **drainage of peatlands** also contributes to significant carbon stock losses. In CEE region, five countries have a significant share of peatlands in their territory: Poland, Romania, Latvia, Lithuania, and Estonia. The rewetting of drained agriculturally used peatlands can significantly reduce emissions from these areas.

There are **no studies on the total climate impact of agri-food sectors in CEE countries**, that would take into account, at a regional or more granular national level, food consumption, food waste, as well as indirect emissions associated with imports of animal feed and land use for fodder production. Nevertheless, these can be significant and need to considered. For example, the livestock sector in CEE region relies heavily on feed imports, in particular also the import of soy from South America, production of which is associated with deforestation.

Agricultural production in CEE countries **increasingly faces risks from intense, prolonged droughts, extreme precipitation events and flooding**. These impacts significantly affect crop production, food security, and drinking water supplies. In the arable sector, the dominance of monoculture cropping, large field sizes in some countries and absence of windbreaks (e.g. Czechia, Slovakia, Hungary, and Romania) further increase the vulnerability to droughts or erosion and put pressure on limited water resources. The risk of desertification is a serious concern in parts of CEE, including Hungary, Latvia, Slovakia, Slovenia, Bulgaria, and Romania. Flash flooding in Slovenia in 2023 seriously affected arable land and grasslands. The interconnectedness of ecosystems and the potential for cascading impacts are increasingly observed and proactive measures are needed to mitigate these risks and enhance resilience.

Building blocks for the sustainability transition and the role of sustainable livestock production

Growing scientific evidence and consensus show that sustainability transition in agri-food systems requires three key building blocks: 1) a move towards a greater reliance on **agroecological practices and nature-based solutions**, including organic farming, agroforestry, paludiculture and more sustainable livestock production; 2) a shift to more **sustainable food consumption**, in particular plant-based diets and increase in consumption of organic foods to promote human and planetary health, and 3) a reduction in food waste to conserve resources. Changes towards more sustainable diets and a **reduction in food waste** can reduce the pressure on land use and thus enable a shift away from a singular focus on maximising annual yields with synthetic inputs towards agroecological approaches. This shift in turn helps to reduce emissions, support biodiversity, sustain the productive capacity of agricultural systems, and support food security.

A key element of transition is also a move towards **sustainable livestock production**. Currently, intensive livestock production, reliant on imports of feed, is a key driver of agricultural emissions, water and air pollution, and biodiversity decline. Since 2000, the CEE region has seen a spatial differentiation in livestock production, with a significant increase in cattle numbers in some areas and the reduction of livestock in more extensively managed areas. Even in countries where the total bovine livestock units have decreased, the ruminant sector still accounts for a significant share of the agricultural emissions mostly due to beef and dairy production. Poultry numbers in the region nearly doubled between 2004–2021, driven by more than a tripling of poultry production in Poland.

To meet the long-term climate targets and stay within planetary boundaries, **technological efficiency improvements, while necessary, are insufficient and an absolute reduction in total numbers of animals is**

needed. Technological efficiency improvements reduce emission intensity of livestock production, but also carry risks for soil health and do not sufficiently reduce absolute emissions or other environmental externalities. Moreover, high output and efficiency in specialised livestock production often comes at the expense of animal welfare, and is linked to increased risk of emergence of zoonotic diseases.

The scale of livestock production that is sustainable in each country and geographic context, while considering global planetary health, remains a matter of discussion. **National scenarios for sustainable livestock production are needed to guide policy discussions.** These need to consider the role of circular and environmentally friendly systems, including mixed organic crop-livestock systems and extensive systems based on grazing and feed self-sufficiency, which can support biodiversity, cultural landscapes, and climate resilience. A shift from intensive livestock towards these systems can support the transition towards more climate friendly agri-food systems, provided they are part of an overall shift towards reduced livestock numbers and plant-based diets.

Contribution of the CAP towards supporting the transition

The CAP can play a major role in redirecting incentives and advisory services to better support the transition due to its significant budget. However, our analysis of the way the 11 CEE countries have designed the CAP demonstrates that **the CAP continues to have limited positive impact for climate mitigation and adaptation and could be much better utilised to support the transition**.

There is a gap between the **budget allocated** towards climate mitigation and adaptation and the untargeted payments towards emission-intensive activities, including livestock production and drainage-based agriculture. The majority of the CSP budget is allocated to payments with weak environmental standards (decoupled, coupled payments) or voluntary one-year commitments (eco-schemes). Targeted environmental and climate payments make up a minor share of the total CAP budget. Moreover, both coupled payments and investment support, which together add up to 22% of the total CSP budget (or 18,6 billion EUR), potentially contribute to further intensification of production in the livestock sector and can thus have perverse effects in terms of climate goals.

The CAP includes in theory some good **mandatory environmental standards** for CAP beneficiaries in the form of conditionality requirements, however, **weak, and insufficient implementation** at country level hinder the large-scale adoption of climate friendly agroecological solutions on croplands and grasslands. The minimum standard on soil management (GAEC 5, 6 & 7) does not sufficiently support soil carbon maintenance and sequestration on mineral soils in arable systems. Furthermore, minimum standards on non-productive landscape features (GAEC 8) are crucial to support on-farm biodiversity. However, the continuing exemptions and derogations limit the potential of this standard with no clear development pathway. Finally, requirements for the protection of permanent grassland (GAEC 1 & 9) do not effectively prevent the ploughing of permanent grassland.

The funding and design of eco-schemes and agri-environmental-climate payments are insufficient to incentivise large scale adoption of sustainable farm practices beyond conditionality. Eco-schemes are an important feature in the CAP due to their application over a large area of agricultural land and their significant budget allocation of around 15% of the total CAP budget. Currently, eco-schemes in CEE countries largely focus on cropland management with limited incentives moving beyond the current baselines, therefore creating mostly windfall effects. Due to their multi-annual nature, ENVCLIM measures provide a more secure funding for more radical transitions towards sustainable and resilient business models, while leaving room for trail-and-error. However, the available budget, area targets and intervention design limit the impact of ENVCLIM measures to incentivize the transition. CEE countries mainly use ENVCLIM interventions to support the adoption or the maintenance of organic farming, animal welfare, and different types of grassland management while measures focused on arable land are limited.

Coupled payments account for a large share of the CAP budget and primarily support the livestock sector without setting clear environmental and animal welfare requirements. This is an ongoing subsidy for

GHG-intensive livestock production and undermines the goal of increasingly plant-based diets within planetary boundaries. At the same time, coupled payments dedicated to fodder and protein plants also mostly and directly support the emission-intensive livestock sector. Coupled payments largely fail to support marginalised sectors or beneficiaries such as sheperds or small ruminants.

Animal welfare payments support very minimal improvements, primarily in intensive-livestock systems (poultry, pigs and dairy) and are a missed opportunity for targeted payments towards an animal welfare-oriented production. The requirements for improving animal welfare are low, with the dominant focus being on technical improvements such as space allowance and living conditions, and only very limited support for more ambitious access to outdoors or to grazing. **Modernisation and productivity investments** make up a major part of the investment funds. They can offer the opportunity to provide incremental financial support for the modernisation of stables including minimum requirements for animal welfare.

Peatland rewetting and agroforestry are key nature-based solutions for climate mitigation, adaptation and other environmental benefits, yet they hardly play a role in the current CSPs in CEE countries. Paludiculture is not supported at all.

Organic farming also receives increased attention under the CAP, although there are differences between CEE countries. The focus is on developing the production side, while processing and market development are lagging. To increase the share of organic farming and strengthen markets for organic foods targeted investment and development interventions are needed for the processing and market development. Institutional capacity building, research and development, as well as farm advisory support are crucial to further develop organic farming in CEE countries.

The CSPs provide very limited support for emission reductions from the livestock sector, with limited interventions and ambition programmed for the R. 13 indicator on Reducing emissions in the livestock sector. Instead, many countries adress the sustainability aspects of the livestock sector through animal welfare interventions (R. 44), with no clear focus on emission reductions and climate protection, and weak overall requirements for animal welfare.

As part of the analysis, a simplified assessment of the potential mitigation impacts of selected interventions in the CSPs of CEE countries was carried out. This assessment considered the area-based payments (eco-schemes, agri-environment-climate payments), animal welfare payments with a clear link to animal health, and investments with explicitly climate-relevant targets. It did not consider impacts from other interventions, such as coupled payments, conditionality or investment interventions on modernisation and productivity. Taking into account the variability in effectiveness and potential uptake of programmed measures, the assessment delivered three potential values – minimum, mid-, and maximum. The maximum values are most likely overestimating the potential impacts, and the mid-values likely demonstrate more realistic impacts.

The assessment confirms that the CSPs for CEE countries deliver limited mitigation impacts, and these come primarily from carbon sequestration. The estimates for the potential mitigation impacts range from very low levels (less than one percent for Latvia, Romania, Slovenia, and Slovakia for minimum mitigation estimates) to greater than 40% reduction of agricultural emissions (Estonia, Latvia and Poland for maximum mitigation estimates), with the most realistic potential values around 17% across the countries. Importantly, the mitigation potential from reducing emissions, i.e. absolute and non-reversible mitigation impact, accounts for less than 10% of the total estimated mitigation impact across all the countries. Carbon sequestration, which is reversible and non-permanent, contributes more than 90% of the positive mitigation impact of the interventions considered in this analysis. This further underscores the need for a step change in ambition on reducing emissions.

The contribution of the NECPs towards supporting the transition

NECPs are a key tool for bridging agricultural, food, and climate objectives. However, the analysis of the draft NECPs in CEE countries shows that they do not reflect sufficient ambition for agriculture as **none of the CEE**

countries are projected to meet their ESR and LULUCF targets. This highlights the need for a step change in mitigation efforts in agriculture and land management in CEE countries. Indeed, agriculture and land management receive very limited attention in current draft NECPs. The emphasis on quantitative climate targets also means that technical measures, which yield easily quantifiable emission reductions are favoured over more holistic approaches, including agroecological practices, agroforestry, peatland rewetting, and dietary changes. This is probably also partly because the mitigation potential of efficiency measures is easier to quantify and that there is a need to increase efficiency in livestock production and more generally in the utilisation of nutrients and other inputs. This is a low-hanging fruit that needs to be addressed.

However, there are two concerns about a singular focus on technological efficiency measures: the total mitigation potential that can be delivered via technological improvements is insufficient, and this approach can further lock-in intensive systems of production through capital investments while also leading to trade-offs for soil health. At the same time, by focusing on the carbon tunnel vision, this approach fails to recognise that not only mitigation but also other environmental and health goals must be achieved simultaneously.

Recommendations for how countries can better support the transition

A **coordinated and systemic approach** is needed to address the changes required both on the production and consumption side. On the production side, policymakers must address farmers' dwindling economic position in the agri-food supply chains, lacking incentives to take up alternative ways of farming, as well as knowledge, tailored advice, and research needed to support farmers in making the transition. On the consumption side, coordinated food strategies, dietary guidelines, support for sustainable public procurement and development of markets for organic foods and plant-based foods are some key instruments to support the transition.

Common Agricultural Policy

In the current period, CEE countries can still significantly improve the climate impacts of their CSPs.
The countries can:

- Introduce **environmental and climate ring-fencing for cross-cutting measures** such as investment interventions. The introduction of **degressivity and capping instruments**, especially in countries with oversized farm holdings, would lead to a fairer distribution of income support towards small and medium-sized holdings.
- Strengthen the **conditionalities** around soil health, permanent grassland protection, landscape features and peatland protection.
- Tie **coupled** payments for livestock to clear environmental and animal welfare standards and limit these payments to livestock raised extensively for purpose of supporting biodiversity, prevention of rural abandonment or other clearly defined environmental goals. Phase out coupled payments that currently go to intensively managed livestock and large dairy and cattle holdings.
- Set high environmental standards and objectives for **investments** funds going towards modernisation and productivity improvements, which currently represent the bulk of the investment budget for farm holdings. Substantially increase the share of the budget going towards targeted climate and environmental investments.
- Strengthen funding and incentive levels for **agroforestry** and **peatland rewetting** through eco-schemes, agri-environment-climate commitments, and advisory support. Introduce pilot projects for developing new agroforestry and paludiculture systems, as a game changer for increasing carbon stocks and improving resilience of agricultural landscapes. Additionally, improve funding for non-peat wetland restoration and landscape features to support resilience and water retention at landscape level.
- **Strengthen the requirements in eco-schemes** in arable systems to set higher ambitions for crop rotation, the inclusion of legumes, residue management, and support for landscape features. Due to the large area that is targeted under eco-schemes, any improvements to eco-schemes will have significant impacts on mitigation, resilience, and biodiversity.
- **Improve the funding and design of ambitious agri-environment-climate commitments** to further avoid deadweight requirements. Improve the flexibility for farmers and ensure sufficient advisory support to increase the interest and uptake in these measures.

- Significantly **strengthen animal welfare interventions** by shifting the support from minimal technical improvements (such as an increase of only 10% in living space) to ambitious requirements for access to outdoors and grazing. Remove support for so-called mega-stables (units with more than 500LSU) under animal welfare and coupled payments.
- **Improve eligibility criteria** for CAP payments to include trees, woody strips, and agroforestry systems. Improve eligibility criteria to also expand the range of paludiculture crops eligible for CAP payments.
- Develop targeted investment and interventions to support the value chains and market development for organic products, and advisory and research capacity for **organic farming**.
- Focus on the development of **institutional capacities, research, and advisory support** for agroecological practices, agroforestry and paludiculture.
- Begin a dialogue and evidence-building to support a **fundamental reorientation of the CAP** post 2028.

National Energy and Climate Plans

To avoid the risks of mitigation action undermining other goals, and to develop synergies with other environmental and public health needs, the NECPs should include **explicit objectives for the increased implementation** of agroecological practices, agroforestry and peatland rewetting, sustainable livestock, and sustainable food consumption.

As a minimum, countries should also aim to quantify the climate mitigation potential of their CAP interventions and develop national assessments for mitigation benefits from dietary changes. National scenarios for sustainable livestock production, and more integrated assessments for agri-food systems can guide policy discussions. These quantifications can serve as a basis for evaluating the need for revisions of the CAP Strategic Plans and development of additional policies.

Policies to support sustainable food consumption

To make progress in this area, a key first step is to **shift the perspective from individual responsibility to the role that food environments play** in determining food consumption. Individual decisions are not made in isolation but are significantly influenced by the contexts in which they occur. Factors such as the availability of sustainable products, pricing strategies, marketing tactics, and social norms shape decision environments and consumer behaviour. Sustainable food consumption can be promoted by shaping the food environments in such a way as to ensure that sustainable and healthy products and meals are the most affordable, available, accessible, and enjoyable. Sustainable and healthy choices become the easy choices.

National and local food strategies can support the improvements in food environments and ensure that the various policy instruments work together coherently. Various tools are available that can be part of this **policy mix**, such as:

1. **Campaigns, food advertising and marketing** address the socio-cultural contexts in which people make their decisions about food consumption. They can help to make sustainable diets more attractive and desirable.
2. **Educational and advisory services** can enable the acquisition of appropriate capabilities and competences to actively apply healthy and sustainable consumption e.g. through cooking skills, gardening skills, but also through the knowledge of the effects of an unsustainable diet and how to change this diet.
3. **Financial incentives** have an influence on supply and demand and can thus reduce the consumption of products containing sugar or animal products, for example, and promote the consumption of fruit and vegetables or plant-based products overall. The financial instruments include taxes, e.g. the meat taxation, the sugar tax, the withdrawal of the reduced VAT rate for animal products, the reduction of the VAT rate for fruit, vegetables and pulses to zero percent or the introduction of an excise tax on animal products.

4. **Out-of-home catering** can effectively shape food environments as it represents an area of food consumption that has been growing for years. Ensuring a more sustainable supply within this sector is crucial for driving the transformation of the agri-food system, especially because public consumption helps shape standards and perceptions of what is considered normal. State actors hold direct influence over this market, particularly in organised catering for public authorities, schools, or hospitals. They can also establish **procurement guidelines, legal regulations, advisory services, and standards**. Furthermore, the communal catering sector can play a pivotal role in fostering the development of bio-regional and plant-based value chains.

Setting clear goals, building societal support, and capacity

It is important to know where the leverage points for change are, but also that this alone is not enough. To speed up the development of the required policies for transition, several streams of actions are needed:

1. **Increase awareness** of what the key elements of the sustainability transition are: how we produce food, dietary changes, and reduced food waste. A useful resource in this context is the webinar series "Climate Action in Agri-food Systems in Central Eastern Europe".
2. **Develop proof of concepts** in different countries and regions that will demonstrate the benefits of the sustainability transition for farmers and wider society.
3. **Define clear and simple goals** that can be easily recognised and broadly accepted, such as concrete goals for peatland rewetting, the establishment of new agroforestry systems, areas utilised for organic farming, consumption of organic foods in schools, production of plant-based foods, ambitious animal welfare with outdoor access and grazing.
4. Build **sufficient political and societal pressure** around these goals.
5. Develop **a broad coalition of societal actors** working together to push for setting up and implementing these concrete goals.
6. **Increase institutional capacities** to support and sustain the transition. While the top-down tools and targets can provide an impetus, bottom-up capacity building is needed to implement these targets through effective and well-designed measures in the CSPs and NECPs as well as in food policy. Efforts and resources are needed to build the capacity of researchers and officials to support decision-making and societal dialogue on how to implement the transition in specific contexts. European research programmes can support this. Exchanging experiences between countries that are more advanced and those that are just starting out with the integrated approach can also be very effective. This can include targeted technical assistance, such as was made available via the Twinning projects during the pre-accession phase and can support public administrations.
7. **Improve cross-sectoral policy coordination**. For example, the demand-side for sustainable food consumption should be reflected in the NECPs and the CAP, and integration between these policies and broader food policies should be set up. This in turn requires better cross-sectoral coordination at ministry level, across ministries which cover agriculture, food, health, and climate policies, and other public agencies. Setting up a coordination unit for sustainable agri-food systems, with a concrete mandate and funding available for their work, can facilitate coordination.

These conditions build on and reinforce each other and can ultimately facilitate the wider transition towards climate friendly and resilient agri-food systems in CEE countries.

1 Introduction

1.1 Introduction

The challenge of climate change has become strikingly clear in recent years. The year 2023 was the warmest year on record, and brought extreme events across Europe, from hail to droughts to flooding. Within this 'new normal' agriculture is particularly affected, due to its exposure to biophysical factors and the often precarious economic situation that farmers find themselves in. On the other hand, agriculture and food consumption more broadly are also key drivers of climate, environmental and public health crises (Richardson et al., 2023; Lucas et al., 2023). Agriculture in the EU accounts for approximately 13% of greenhouse gas (GHG) emissions, and the whole agri-food system for nearly a third of global emissions (Crippa et al., 2021). Both lead to biodiversity decline, environmental degradation and health costs associated with currently dominant diets (EEA, 2023a). There is growing recognition and consensus that we urgently need a coordinated, synergistic and holistic action to address these multiple and interconnected crises and improve the sustainability of agri-food systems (Barrett et al., 2022; FAO, 2023).

Scientific evidence shows that sustainability transition in agri-food systems requires a shift towards greater reliance on agroecological practices and nature-based solutions as part of an alternative paradigm which builds on ecological principles in managing agricultural systems. Agroecological practices replace the need for external inputs, such as synthetic pesticides, mineral fertilisers, and antibiotics. They include a wide range of practices, such as crop rotation, inclusion of legumes or cover crops, as well as more complex system re-design, such as organic farming or agroforestry (Gliessman, 2016). These agro-ecological practices are a subset of the broader nature-based solutions, which also include activities such as peatland rewetting or paludiculture. Ultimately, agroecological practices and nature-based solutions[1] enable reduction of greenhouse gas emissions, maintenance and increase of carbon stocks, as well as biodiversity and soil health protection, thereby ensuring the long-term productive capacity of agriculture (Nadeu, 2022).

In the short term and compared to conventional systems reliant on synthetic inputs, the transition to agroecological solutions can lead to lower yields, which some stakeholders have argued would threaten food security. However, food security is not a concern in the EU context, although lower output is a risk in terms of carbon leakage and displacement of EU emissions abroad. Recent studies have shown that, if the transition to agroecological practices is coupled with a shift towards more plant-based diets and a reduction in food waste, this can ensure sufficient agricultural output and simultaneously deliver climate, environmental and health goals (Schiavo et al., 2023; Sun et al. 2022).

With this report we aim to contribute to the discussion on sustainability transition in agri-food systems in Central Eastern Europe (CEE) and on how this transition can be supported through a more systemic and integrated approach that puts at its core agroecological practices and sustainable diets in order to deliver climate, biodiversity and health benefits, while also supporting farmers' incomes and their resilience.

Why a focus on the Central Eastern European countries?

The eleven countries of the CEE region – Bulgaria, Croatia, Czechia, Hungary, Estonia, Latvia, Lithuania, Poland Romania, Slovakia, Slovenia – account for approximately a third of the total agricultural land and 23% of the EU agricultural emissions (EEA, 2021), indicating that the region is key for meeting EU climate goals. The region shares historical and socio-economic similarities, as well as challenges and opportunities, which make it distinct from non-CEE countries. Yet, there has been little focus on these specificities, either in policy design or in critical analyses of EU agri-food policies. This report is motivated by the recognition that these specificities are important and that it is especially important to build bottom-up capacity within the region to drive integrated and holistic approaches for sustainability transition.

1 For the sake of brevity, we only use the term agroecological practices from this point onwards.

Based on insights from national experts, a series of online discussions[2], and analysis of the implementation of the Common Agricultural Policy (CAP), we can identify some shared characteristics. There is considerable dominance of a productivist agenda in the region, with the agricultural discourse focused primarily on the need to increase competitiveness, productivity, and efficiency and these are often seen in direct conflict with biodiversity, environment or climate goals (e.g. Rac et al., 2023). Synergies between these goals are not a focus. This agenda is clearly also linked to structural transformations in the region itself and the broader global political economy of agri-food systems. The last two decades have seen an intensified social and economic decline in rural areas in CEE countries (Pašakarnis & Maliene, 2010). The accession to the EU, the transposition of the CAP and the opening of new export opportunities, have also driven intensification and specialisation of agricultural production in CEE countries.

The agricultural sectors in CEE countries have a higher share of smallholder and semi-subsistence agriculture compared to non-CEE countries (Eurostat, 2024a). These smallholdings have an important economic role in rural areas (Hubbard et al., 2014). Especially for part-time and older farmers, but also more broadly, administrative burden and additional surveillance impacts arising from the CAP implementation are a significant concern, and this has to be understood within historical context (Frelih Larsen, 2009). Due to natural limitations and the smallholding structure, the intensification process in CEE agriculture has been slower in some areas and production systems (Bański & Mazur, 2021), so that CEE countries continue to hold important areas of high nature value farming (Sutcliffe et al., 2015).

The discourse around agriculture and environment has so far been focused more on biodiversity loss. Civil society initiatives around systemic issues in agri-food sector are mostly absent. Producer organisations that have sustainability as their focus (e.g. organic farming, small farmers' associations) generally have a weaker status and funding base compared to conventional farmers' interests. Adaptation needs, in particular following droughts and extreme events, are driving some changes, but there is also a risk that the solution space under discussion still remains largely or solely focused on technological solutions because it is part of a broader productivist and modernisation agenda (see, McKinsey & Company, 2022).

The dominance of the productivist concerns and policy focus is, of course, not just specific to CEE countries. However, the spaces for alternative discourses in CEE countries are smaller, in part conditioned by the weaker role of civil society (Kutter & Trappmann, 2010). Due to limited civil society and institutional capacities, the developments in environmental and climate policies have been driven disproportionately by top-down EU initiatives. Several CEE countries are also smaller than Western counterparts, which puts further pressure on administrations to manage the design and implementation of many complex policies. There are few policy discussions taking place around the potential and opportunities of pursuing a holistic approach that would merge the environmental, climate, and health agendas and address both supply and demand aspects.

The research and knowledge & advisory capacities to support the knowledge-intensive agroecological practices or agri-food system transition are scarce (e.g., Jehlička et al., 2020). Available research is focused more on partial approaches (specific practices, or GHG foot printing), whereas system re-design, such as agroforestry and paludiculture are much less supported. In-depth assessments of mitigation and adaptation needs, economics of transition, scenario building to support strategic decision-making are limited or lacking. In many cases research into agroecological or sustainability topics around food is driven by EU Horizon projects, with few national research projects or programs focused on agroecological approaches. Even within European research projects, the share of support going to CEE countries is limited and is reflected, for example, in smaller inclusion of CEE research institutions in these projects. For example, the overview of projects in a recent inventory of carbon farming projects shows that typically CEE countries have few partners in Horizon projects, and certainly less than 1/3 of partners despite covering a third of the agricultural area in the EU (see, Springer, 2023).[3] CEE partners also rarely lead Horizon projects.

2 The webinar series was organized in Autumn 2023, with the recordings and presentations available at: https://www.ecologic.eu/19400

3 See: https://carbonfarminginventory.ieep.eu/

On the demand side, there has been significant progress made around food waste, in part driven by EU level targets and activities. Several CEE countries have national programmes for food waste in place (i.e. BG, LV, PL, RO, SK, SI) (EC, n.d.). Activities focused on changing consumption patterns are emerging, however the discourse on the need for dietary changes is still quite limited, or controversial. The market for organic foods is mostly immature or lacking, where organic farming has grown, the market has not been developed in parallel so that organic food is also not sold as organic (e.g. beef in Slovenia).

The increasing awareness of climate impacts presents an opportunity to push and prioritize a more integrated agri-food system perspective and a shift towards the paradigm where 'sustainability and agroecological practices are basic elements of competitiveness and resilience'. Numerous initiatives have emerged recently that begin to support this shift[4]. However, much more capacity and coordination is needed, within civil society, research and public administrations to drive the synergistic agenda at a faster pace. Currently, there is limited funding and effort put in developing this capacity.

Against this background, this report aims to provide inspiration and offer a framing for stakeholders to pursue a more holistic and coordinated approach for transitioning towards climate friendly and resilient agri-food systems in CEE countries. The report draws on mixed methods, including literature analysis, analysis of policy documents, as well as interviews and online meetings with national experts and stakeholders.

Structure of the report

Chapter 2 first gives a high-level overview of climate mitigation and adaptation needs in relation to agri-food systems in CEE countries.

Chapter 3 outlines the building blocks for sustainability transition and their benefits: agroecological practices and nature-based solutions, sustainable diets, and reduced food waste. In Chapters 4 and 5 we explore the extent to which these solutions have already been supported by the two most important and key policies that are currently driving climate action in agri-food systems: the Common Agricultural Policy and National Energy and Climate Plans (NEPCs). These chapters are more technical in nature, underlining the importance of these areas and concrete gaps that stakeholders can focus on.

Chapter 4 analyses the climate ambition of the national strategic plans of the Common Agricultural Policy (CAP) for the 2023-2027 period, providing insights about the extent to which these plans support agroecological solutions and where gaps and opportunities are to improve the alignment of the CAP with long-term climate targets.

Chapter 5 provides an analysis of the draft NECPs submitted to the European Commission by the CEE countries, exploring the ambition shown for agriculture and food in these plans, as well as what types of measures are supported. We show that much progress needs to be made to better integrate agriculture and food targets within NECPs and promote agroecological solutions and dietary shifts as opposed to solely focusing on technological solutions.

Chapter 6 turns to policy tools that countries can use to support sustainable food consumption, moving away from singular focus on human health and personal responsibility of consumers towards recognizing the importance of shaping food environments, and incorporating climate and environmental aspects in sustainable food consumption.

Finally, **Chapter 7** provides some concluding thoughts on key conditions that can facilitate the transition, such as setting clear goals, building societal support, and capacities.

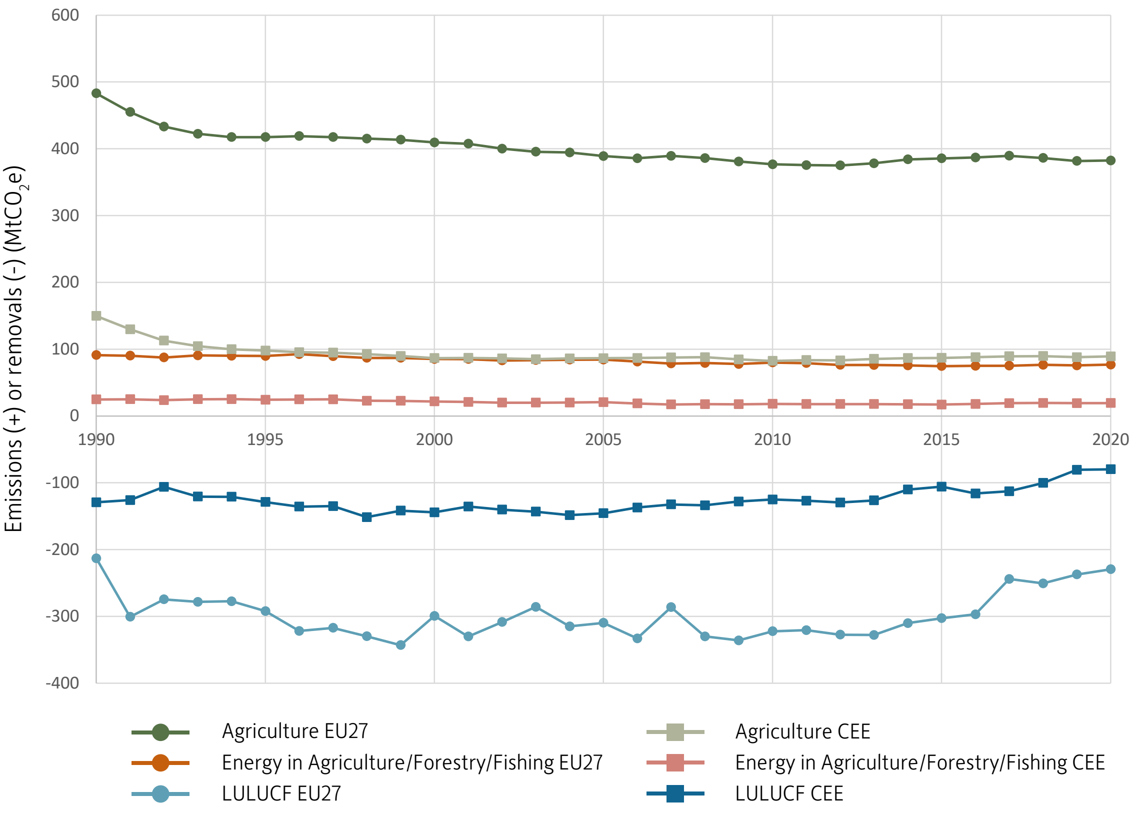
4 For example, Climate KIC in Slovenia has been exploring a systems approach to food: https://www.climate-kic.org/circularslovenia-2-2/

2 Climate mitigation and adaptation needs in agri-food systems in CEE countries

2.1 Stagnating agricultural emissions

Following the collapse of socialism, the cumulative greenhouse gas emissions in CEE countries dropped significantly during the 1990s, decreasing by up to 45%. These reductions were driven largely by the shrinking livestock numbers, collapse of large scale collective farms, and reductions in N-fertilisers (Pérez Domínguez & Fellmann, 2015; Khangura et al., 2023). Total emissions continued to decrease until 2010, but since then show a slight upward trend so that current agriculture emissions for the region are largely the same as in year 2000 (see Figure 1).

Figure 1: GHG emissions and removals (Mt CO_2e) for agriculture, LULUCF and energy (agriculture, forestry, fishing), for the EU27 and the CEE 11, 1990 to 2020



Source: Own depiction based on EEA, 2024.
Note: Energy in Agriculture/Forestry/Fishery: Emissions resulting from the operation of agricultural machinery, or the heating of stables are allocated to the energy sector in emission accounting ('crf 1.A.4.c'). However, they relate to agriculture practices and are therefore listed above. Emissions from the agricultural use of drained peatlands are not included in this inventory data.

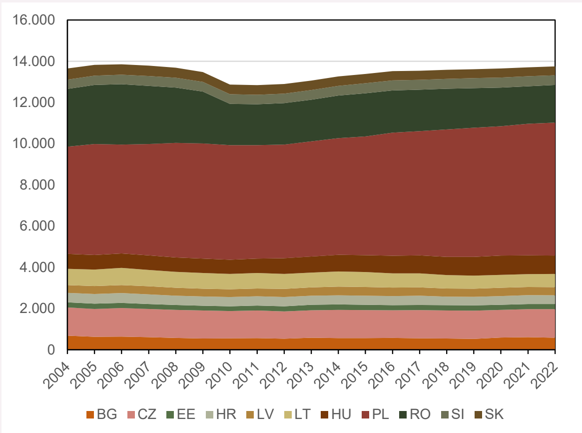
The stagnation in agricultural emission reductions since 2000 has occurred despite technological advances that lead to reduced emission intensity of production, most likely because technological efficiency improvements have been offset by an increased intensification or expansion of production, including in livestock and arable production.

Box 1:

Livestock production in CEE countries

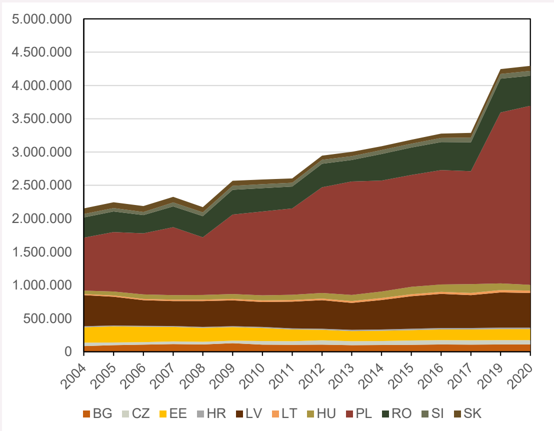
The number of livestock units (LSU) for bovine animals dropped between 2004-2010, and then increased again from 2010-2021 for a small total net increase (0.7% increase) over the 2004-2020 period (Figure 2). In Croatia, Bulgaria, Lithuania, and Romania bovine LSU decreased by 9%, 15%, 19% and 35% respectively, and in Poland and Hungary there has been a 24% and 23% increase in bovine LSU between 2004-2021. In Slovakia, Slovenia, Czechia, Latvia, Estonia the bovine LSU increased much less, between 0.7% - 5.5%.

Figure 2: Number of bovine livestock units in CEE countries in 1000s



Source: FAO 2024

Figure 3: Production of poultry meat in CEE countries in tonnes



Source: FAO 2024
Note: Data for 2018 and 2021 is incomplete and removed.

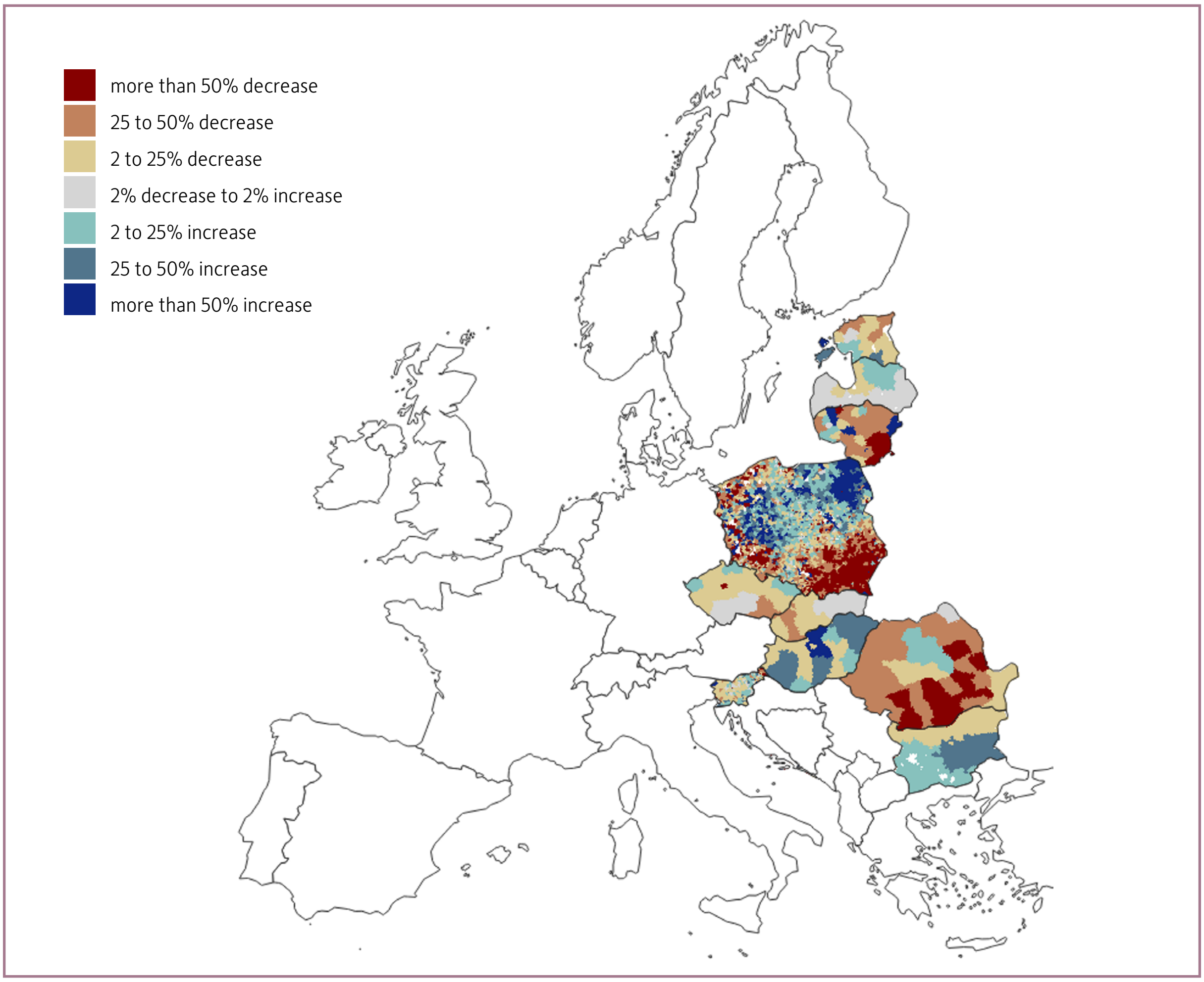
Poultry numbers in the region nearly doubled between 2004-2021, driven by more than a tripling of poultry production in Poland. Only in Estonia and Slovakia poultry production decreased in this period (Figure 3). Pig numbers have decreased in the whole region, but the imports of pork have increased substantially (by 400%). The region is a net exporter of beef and poultry, and a net importer of pork.

In the same period, the consumption of soy (largely driven by animal feed use) has increased by 40%. Imports of soy from South America have increased, as well as domestic production of soy.

All data from FAO 2024.

In addition to the overall increase in livestock numbers, there has also been a spatial differentiation in livestock production, with some areas experiencing significant increase in livestock numbers and others decreases (see Figure 4). These trends can be seen in practically all countries, regardless of overall trends in livestock numbers. Spatial concentration has been especially pronounced in some parts of Poland, Croatia, Hungary, and Lithuania. Decrease in bovine livestock numbers has been more intensive in Slovakia, Czechia, Romania, Bulgaria, and Estonia.

Figure 4: Changes in cattle livestock units between 2000 and 2020 (in % increase/decrease) for CEE countries



Source: Malek et al., 2024

In many countries a large share of livestock is kept indoors. For example, in Czechia, Slovakia, Hungary, and Estonia more than half of livestock is concentrated in megastables[1] (69%, 60%, 59% and 55% respectively) compared to the EU average of 31% (Debonne et al. 2022). There has also been an increase in the share of livestock reared in mega-stables between 2005 and 2020, especially in Poland, Croatia, Latvia, and Romania[2] and a decrease in livestock reared extensively. Increase in livestock in some part of the countries and decrease in livestock number in other parts, either via abandonment of agricultural production or specialization in arable production, has important environmental impacts locally. This double trend is linked to impacts on air, water quality and loss of biodiversity. Therefore, addressing the issue of livestock production for climate goals also has important other benefits locally.

Even in countries where bovine LSU have decreased and where livestock production is limited, the ruminant sector still accounts for a significant share of the agricultural emissions mostly due to beef and dairy production. For example, in Hungary crop production is responsible for 47% (mostly due to synthetic fertilizer use), whereas livestock production accounts for 35% of emissions (from enteric fermentation and manure management) with (McKinsey & Company, 2022).

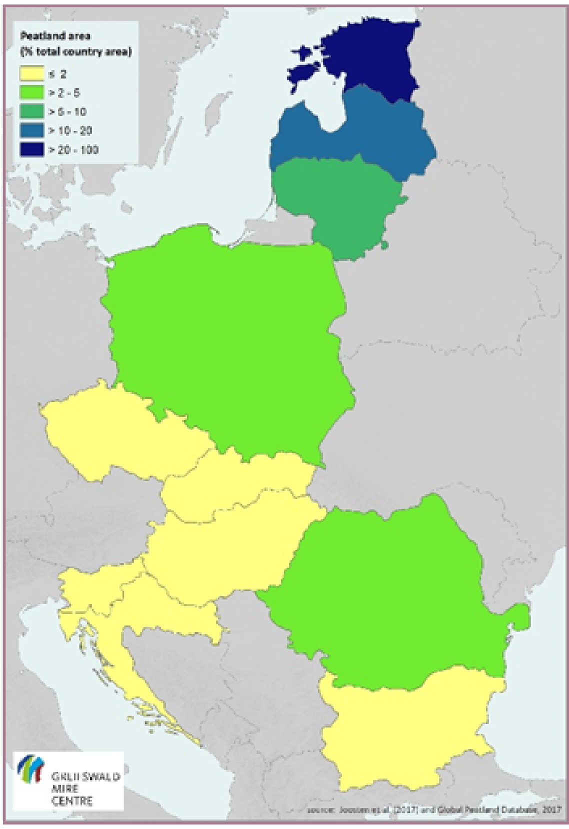
1 Holdings with more than 500 livestock units.

2 The share of poultry in CEE countries reared in such large farms has increased from 37.4% to 61.1% from 2005 to 2020. The share of poultry reared in megastables increased the most in Croatia (+148.9%), Poland (+139.6%), and by more than 50% in Latvia, Romania, and Slovenia. The share of pigs raised in megastables increased from 29.5% to 52.9%, with the highest increases seen in Poland (+130.4%), Romania (+95.3%), Latvia (+48.6%) and Bulgaria (+36.4%).

Loss of carbon stocks

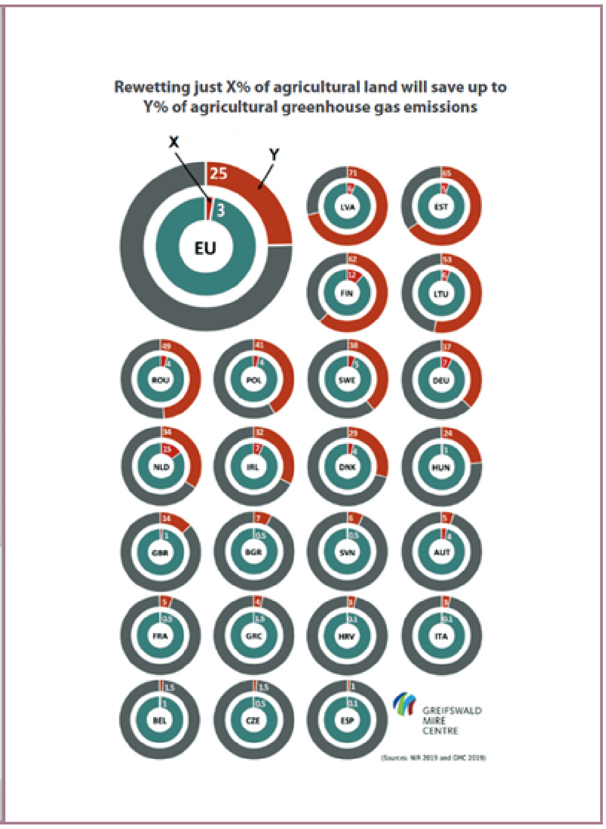
The carbon stocks, i.e. carbon stored in soils and in above ground biomass, in particular forests and individual trees, have decreased significantly since 2010, albeit to a lower degree then in EU27 (see LULUCF CEE curve in Figure 1). This is reflective of increasing climate impacts, including damage to forests through bark beetle infestations and extreme events, such as fires and ice storms. In addition to extreme events, the continued drainage of peatlands also contributes to significant carbon stock losses. In CEE region, five countries have a significant share of peatlands in their territory: Poland, Romania, Latvia, Lithuania, and Estonia (Figure 5). Many of these peatlands continue to be drained for agricultural production[3]. The rewetting of drained agriculturally used peatlands can significantly reduce emissions from these areas. For example, if Poland and Romania rewet only four percent of their drained peatlands under agricultural use, this could lead to 41% and 49% reductions in agricultural emissions respectively (Figure 6).

Figure 5: Peatland area per country in Europe (in % of total country area)



Source: Greifswald Center, 2024, based on Joosten et al. (2017) and Global Peatland data-base 2017, Note: The total peatland area of these countries are in km² based on Tanneberger et al. 2017: BG: 208; HR: 33,1; CZ: 285,4; EE: 9150; HU: 300; LV: 7514; LT: 6460; PL: 14950; RO: 7690; SK: 60; SI: 83,9

Figure 6: Country-specific potential for emission savings from rewetting agricultural land



Source: Greifswald Center, 2024, Note: This infographic shows the potential savings in total agricultural GHG emissions from re-wetting a given share of drained and agriculturally used peatlands (inner circle) in EU.

Indirect emissions associated with imports of feed and meat

The data presented above does not include indirect emissions associated with the imports of food and feed for livestock production. There are no studies on the total climate impact of agri-food sectors in CEE countries, taking into account, at a regional or more granular national level, food consumption,

3 Emissions from organic soils are underexposed in the National Inventory Submissions of EU countries mainly due to undifferentiated presentation of the total land use sector, in which organic soil sources are obscured by forest biomass sinks, and the reporting of agricultural emissions is split over the two sectors- Agriculture and LULUCF (Barthelmes 2018). Therefore, emissions from drained peatlands cannot be displayed separately in Figure 1.

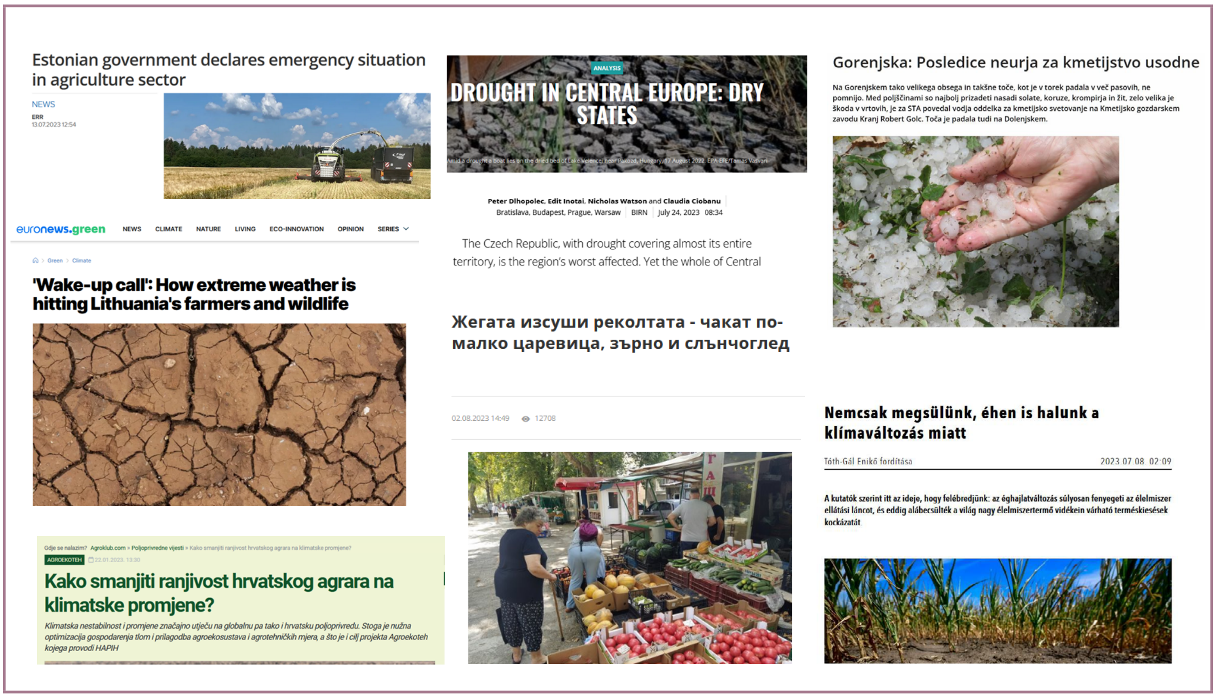
food waste, as well as indirect emissions associated with imports of animal feed and land use for fodder production. Nevertheless, these can be significant and need to considered.

For example, the livestock sector in CEE region relies heavily on feed imports, in particular also the import of soy from South America, production of which is associated with deforestation. Imports of soy and soy cake to the CEE countries increased by 53% between 2004 and 2021 (FAO 2023). In 2021, imports from South America represented 71.3% of all imported soy, with Brazil and Argentina presenting 33.9% and 32.1% of total soya imports into the CEE countries. Unsurprisingly, direct imports of soy from third countries are highly concentrated in three countries with international ports: Poland imported 62.2% of all South American soy in the region, followed by Slovenia (20.9%) and Romania (15.9%). While Slovenia exports most of the imported soya to other CEE and also neighboring countries, such as Austria and Italy (U. S. Soybean Export Council, 2020), Poland uses most of it for its own livestock (mostly poultry) sector (Janocha et al., 2022).

Increasing climate risks

Agricultural production in CEE countries increasingly faces risks from intense heatwaves (Turnau et al., 2022), prolonged droughts (Toreti et al., 2022), extreme precipitation events and flooding (Alfieri et al., 2015; MedECC, 2022). These impacts significantly affect crop production, food security, and drinking water supplies. Figure 7 shows only a few of recent headlines reflecting increasing presence and impacts associated with climate extremes.

Figure 7: Recent local news headlines regarding weather extremes and climate risks



Source: Own compilation.

In the arable sector the dominance of monoculture cropping, large field sizes in some countries and absence of windbreaks (e.g. Czechia, Slovakia, Hungary, and Romania) further increase the vulnerability to droughts or erosion and putting pressure on limited water resources. Slovakia, for instance, has an arable sector dominated by three types of crops in 70% of the arable sector (cereals, corn, and rapeseed) with the largest farms as large as 1.000 plus hectares. The 2022 drought in Hungary nearly collapsed the production levels in the arable sector, thus also triggering much greater awareness among farmers and stakeholders about the need to better manage water from field to landscape level. The risk of desertification is a serious concern in parts of

CEE, with Hungary, Latvia, Slovakia, Slovenia, Bulgaria, and Romania declaring themselves affected under the UN Convention on Combating Desertification[4]. The Romanian Dobrogea region along the Black Sea, for example, already experiences desertification due to changing climate (increasing temperature, less precipitation, stronger winds) and lack of adaptation (Vorovencii, 2015)[5]. Flash flooding in Slovenia in 2023 seriously affected arable land and grasslands. The interconnectedness of ecosystems and the potential for cascading impacts are increasingly observed and proactive measures are needed to mitigate these risks and enhance resilience.

4 https://www.climatechangepost.com/bulgaria/desertification/

5 https://www.the-kingfisher.org/environment/grasslands/europe/desertification.html

3

Building blocks for the sustainability transition in agri-food systems

Agri-food systems are currently dominated by the high-input/high output agricultural production model, dependent on external synthetic inputs such as synthetic pesticides and mineral fertilisers, with high spatial specialisation of production, reliance on heavy machinery, as well as a high degree of export orientation and vertical integration in the supply chains. Since WW2, this production model has lead to incredible increases in yields and calorie production to feed a growing global population (Oliver et al., 2018). Yet, increasing efficiency and maximisation of yields has come at a considerable cost: greenhouse gas emissions, environmental degradation and biodiversity loss, which undermine the long-term productive capacity of ecosystems to support a stable food supply. At the same time, a substantial amount of food currently produced is wasted along the value chain, contributing further to environmental degradation and representing a missed opportunity to improve nutritional outcomes (Barrett et al., 2022). The inefficiency of the current food system is further reflected in the detrimental effects on human health, due to the overconsumption of animal products and a high intake of processed foods, leading to widespread obesity and related health issues, including cardiovascular diseases, diabetes, and certain types of cancer (Ruggeri Laderchi et al., 2024). The estimated annual costs associated with consumption of animal based products (driven primarily by health costs, but also environmental costs) are between 3.000 – 4.000 EUR per capita per year (FAO, 2023; Lucas et al., 2023).

There is increasing scientific evidence and consensus that the transition towards climate friendly and resilient agri-food systems requires three key building blocks, which need to be pursued at the same time. These building blocks are:

- A shift in the way that food is produced - towards a greater reliance on agroecological practices and nature-based solutions
- A shift towards more plant-based diets and organic foods
- A reduction in food waste

Below we outline why these are needed and their main benefits.

3.1 Nature-based and agroecological solutions

Peatland protection

Soils play a central role in climate change mitigation and adaptation. They store significant amounts of carbon and have the potential to increase their sink capacity through soil organic carbon (SOC) sequestration (Frelih Larsen et al., 2022). Given the significant potential that soils carry for climate mitigation and adaptation, they need to form a central part of sustainability transition. To realize soils´ potential, research shows that nature-based measures with significant mitigation potential and sustainability benefits need to be prioritized. This includes preserving current stocks, especially on peatlands where the stocks and losses are the highest per area, as well protecting and enhancing carbon stores on mineral soils.

Peatlands store four to five times more carbon than trees (Swindles et al., 2019), a huge but vulnerable carbon store that must be maintained and restored. They are characterized with an organic matter content of at least 30%. They offer a full range of important ecosystem services: store and regulate water, support unique biodiversity, and provide essential social and cultural values. However, peatlands must be wet to fully provide these functions. About half of the peatlands in the EU are drained (Tanneberger et al., 2021). Drained peatlands release previously stored carbon as well as other GHGs (especially nitrous oxide) and lose their ecosystem services. When peatlands are restored, they can also sequester additional CO_2 from the atmosphere. However the sequestration would occur over a very long period, so that in the short-term rewetting mainly contributes to avoided emissions.

Countries can take different approaches to avoid GHG emissions from peatlands. First, they can reduce the pressure for intensification of agricultural use of peatlands, for example by converting agricultural use from ploughed arable land to more extensively managed grasslands (Birdlife et al., 2022). Secondly, drained peatlands can be rewetted and restored, and paludiculture supported. Paludiculture is the productive use of wet and rewetted peatlands that preserves the peat soil and thus minimizes CO_2 emissions and subsidence. The shifting from drainage-based agriculture to paludiculture is one of the most effective agricultural interventions for climate mitigation, while also enabling biodiversity protection, evaporative cooling, and sustainable water management (MSF, 2021). By supporting the regulation of water flows in a landscape, peatlands play an important role in climate adaptation, reducing the risk of flooding (Bonn et al., 2016).

In addition to peatlands, is also important to restore non-peat wetlands and mosaic-like landscapes. Wetlands and landscape elements, such as trees, hedgerows and standing water increase the water retention capacity of landscapes, improves water supply in drier periods, and increases the ability of soils to absorb and retain moisture (Timar et al 2024).

Agroforestry systems integrate woody vegetation (trees or shrubs) with crop and/or animal systems, and hold significant potential for climate change mitigation and adaptation by storing carbon in above-ground biomass as well as soils (Mayer et al., 2022). The carbon storage potential varies across EU27 countries, ranging from 0,3 to 27 t CO_2e/ha/year, influenced by biogeographical regions and agroforestry system types (Kay, 2019). Agroforestry improves local microclimate, provides shading for livestock, acts as wind and rain protection for crops and livestock, and buffers against weather extremes, thus contributing to climate adaptation (Frelih-Larsen et al., 2022; Torralba et al., 2016). Furthermore, the introduction of agroforestry has demonstrated a positive impact on water quality by reducing herbicide and pesticide losses by an average of 49% (Zhu et al., 2020). Overall, agroforestry systems are recognized as the most cost-effective nature-based options for climate change adaptation and mitigation (Shukla et al., 2019).

Agroecological farming practices on croplands and grasslands

Croplands and grasslands on mineral soils constitute most of the cultivated land in Europe and are characterized by an organic matter content of up to 30%. They are subject to diverse management interventions, all of which have an impact on soil organic carbon (SOC) stocks to some extent. Agroecological practices on croplands include a move from monoculture crop production to greater spatial and temporal diversity of crops, by relying on crop rotation, integration of legumes, cover crops, and reduced soil disturbance. Preventing soil compaction is also very important as a strategy for maintaining healthy soils. Converting arable soils to grasslands in lower productivity areas or where there is high risk of erosion, adding landscape features such as hedges and trees, and the establishment of agroforestry systems, also have high mitigation potential and multiple other benefits on croplands and grasslands (Frelih Larsen et al., 2022).

It is important to note that the additional potential of soil carbon sequestration in croplands and grasslands on mineral soils through soil management measures is limited, uncertain and the risk of intentional or unintentional reversal of sequestered carbon is high. Nonetheless, improving management on arable and mineral soils is still absolutely needed. If current agricultural land management practices are not improved, croplands especially will continue to lose carbon. Climate impacts also lead to additional losses. This calls for vast improvements in arable systems, primarily as an adaptation strategy with co-benefits for maintaining carbon stocks.

Agroecological practices also lead to reduced reliance on synthetic fertilisers, increased nitrogen efficiency and thus N_20 emissions, or reduced CH_4 emissions. Moreover, agroecological practices support resilience and reduce hidden costs associated with conventional agriculture, such as reducing water pollution or reduced exposure to pesticides (LVÖ Bayern, 2023; Pouchieu et al., 2018). Agroecological practices support improved water retention and water balance, protecting yields from natural disturbances such as droughts, therefore also increasing stability of yield (van Dijk et al., 2024). There is growing evidence that agroecological practices also deliver socio-economic benefits to farmers (van der Ploeg et al., 2019).

Organic farming: Organic agriculture is a codified form of production, and a whole systems approach that relies on agroecological farming practices to avoid the use of synthetic fertilizers and pesticides. Organic farming emphasizes soil health, closed nutrient cycles at farm level, and crop diversity, and better animal welfare conditions, including better indoor conditions combined with access to outdoor space and grazing, more room to move freely in general, and a restricted use of antibiotics and hormones (IFOAM Organics Europe, 2022). In this way, organic farming is an important strategy for increasing resilience in food production.

A key criticism of organic farming in the context of climate mitigation is that it leads to reduced yields and that GHG emissions per gram of protein in organic meat are higher relative to conventional livestock production (Waite et al., 2024), mainly because the production of the same amount of protein needs more land. However, the argumentation around reduced yields and increased GHG emissions per output does not consider parallel reductions in food waste and a shift towards more plant-based diets (Muller et al., 2017). A recent study also shows that indirect emissions in organic livestock are lower because of avoidance of imported soy feed and the use of fossil fuels is also significantly lower in organic dairy farming (Hülsbergen et al., 2023). There is also evidence to suggest that when people consume organic foods, they tend to have more plant-based diets (Kesse-Guyot et al., 2022). An increase in organic farming, including a shift from intensive livestock towards more mixed organic livestock production, based on feed self-sufficiency, can support resilience and be part of a mix of solutions for more climate friendly agri-food systems, provided it is part of an overall shift towards reduced livestock numbers and more plant-based diets.

3.2 Sustainable diets and reduced food waste

There are three key strategies for delivering more sustainable diets: a move towards plant-based diets, increase in consumption of organic foods, and reducing food waste.

Moving towards plant-based diets

The term "plant-based diet" encompasses a spectrum of eating habits, from moderately incorporating animal products to purely vegan diets. A well-known example of a plant-based diet is the Mediterranean diet. In public discussion, the term plant-based is frequently misinterpreted as meaning „purely plant-based" or "vegan" (Quack et al., 2023). Rather, descriptions of plant-based diets predominantly highlight the promotion of wholesome, plant-derived foods such as fruits, vegetables, whole grains, legumes, nuts, and seeds with a limited share of foods from animal origin (EUFIC, 2021).[1]

A shift towards more plant-based or plant-rich diets is a central strategy for sustainability transition in agri-food systems because of the high resource and emission intensity associated with animal-based foods. Shifting towards a greater reliance on plant-based foods relieves pressure to maximise agricultural production with high-input / high-output agricultural model and enables a shift towards agroecological practices, organic farming, agroforestry and paludiculture.

Technological efficiency improvements can reduce emission intensity of livestock production, reducing the carbon footprint per unit of output. These improvements focus, for example, on feeding and breeding strategies, biogas, manure storage, machinery for low-emission slurry application, or urea and nitrification inhibitors. Indeed, efficiency improvements need to play a role in reducing agricultural emissions and in CEE countries there might be more opportunities for increasing efficiencies compared to non-CEE countries. However, there are two significant concerns with this approach. First, some of the technologies, such as machinery used in low-emission slurry application and synthetic nitrification inhibitors also carry risks for soil health and thus potentially undermine productive capacity of soils.[7] Secondly, these technologies do not sufficiently reduce absolute emissions or other environmental externalities. Despite technological improvements and significant

1 In their updated guidelines from 2024, the German Nutrition Society, for example, recommends that milk products can be consumed daily, and meat consumption should be limited to 300g per week. For more information see: https://www.dge.de/gesunde-ernaehrung/gut-essen-und-trinken/dge-empfehlungen/.

investment in efficiency improvements and modernisation of production, agricultural emissions in CEE region have continued to stagnate, and since 2010 they have increased again, also driven by increasing livestock numbers. To meet long-term climate targets and stay within planetary boundaries, technological efficiency improvements are insufficient by themselves and an absolute reduction in total numbers of animals is needed along with a shift towards more plant-based diets (Lucas et al., 2023; Laine et al., 2021; Schiavo et al., 2023; Poore & Nemecek, 2018).

Moreover, high output and efficiency in specialized livestock production often comes at the expense of animal welfare. When animals are kept in confined spaces and without access to natural behaviours such as grazing, foraging, or social interaction wellbeing, this leads to physical and psychological stress, and increased susceptibility to injuries and various diseases, the latter of which have also broader implications for public health and the environment. The increased use of antibiotics in livestock production contributes to the development of antibiotic-resistant bacteria. Livestock conditions ease the emergence of zoonotic diseases, namely, diseases that can be transmitted from animals to humans like the COVID-19 virus.

Importantly, more plant-based diets also support human health by promoting increased consumption of fruits, vegetables, whole grains, legumes, and nuts (Willett et al., 2019). Recent studies have shown that current dietary patterns that lead to non-communicable diseases are a key contributor to the hidden health costs of agri-food systems (FAO, 2023; Lucas et al., 2023).

How much reduction in livestock numbers?

The precise share of animal based foods and numbers of livestock that are sustainable in a given country and geographic context, while considering global planetary health, remains a matter of discussion. A recent study on the safe operating space for livestock in the EU indicates that all CEE countries would need to achieve some reductions in direct livestock emissions by 2050, if agriculture would contribute the same emission reductions as other sectors. However, for countries with the lowest livestock populations, such as Bulgaria, Slovakia, or the Baltic countries, the required reductions in direct livestock emissions would be slower and lower (Buckwell and Nadeu, 2018).

Much progress is currently also being made on developing new food based dietary guidelines, which define sustainable levels of animal based foods in diets, considering both health, environmental and climate impacts for different regions. For example, this includes the recently revised Nordic dietary recommendations and the German dietary guidelines (Blomhoff et al., 2023, Schäfer et al., 2024; DGE, 2024). Revisions are also currently taking place, for example, in Austria and Slovenia.

National and regional scenarios for sustainable livestock production are very still much needed to guide policy discussions around agri-food sustainability transition. These scenarios need to also consider the role of circular and environmentally friendly systems of livestock production, including mixed crop-livestock systems, organic farming, or more extensive production, which can develop better efficiency through synergies between crop and livestock systems, and by keeping livestock linked to the production capacity of the land (i.e. eliminating the import of feed) and keeping to the required long-term climate targets (Garrett et al., 2020).

Even if the details at granular (national) level have not been worked out yet, the need for the general direction of travel is clear: a move towards more plant-based diets combined with a reduction in livestock numbers over longer term. Any shift in this direction reduces the need for feed imports, reduces water demand, environmental impacts and greenhouse gas emissions, and supports public health goals (EEA, 2024b).

More consumption of organic foods

The environmental benefits of organic farming have been outlined above. From a consumption perspective, there has been debate around whether there are differences in the composition of organic and non-organic crops and foods. More recently, there have been several studies that organic food consumption leads to reduced exposure to pesticide residues, and studies have also found reduced exposure to cadmium and higher levels of antioxidants (EFSA, 2018, Baranski et al., 2014).

In terms of prevention of diseases, a recent meta-analysis found that organic food consumption had a beneficial positive association with human health, although further research would be needed for individual diseases (Jiang et al., 2023). Two large cohort studies, in France and the UK, have shown positive association between regular consumption of organic food and incidence of certain types of cancer, risk for obesity, type 2 diabetes (Bradbury et al., 2014; Baudry et al., 2018, Kesse-Guyot et al 2022). A similar study in Denmark did not find this connection, however without specifying specific reasons for this (Andersen et al., 2023). Additional research across different countries, also taking into account other lifestyle factors and diet considerations (e.g. degree of plant-based eating), would be needed to show a more nuanced understanding of human health benefits and causal conclusions.

There are therefore indications that regular consumption of organic foods may be associated with improved health outcomes. However, to support both human health and environmental benefits organic-based diets should be accompanied with a shift towards more plant-based diets as well (Kesse-Guyot et al., 2022).

Reducing Food Waste

According to Eurostat, estimated 10% of food in Europe is wasted, after it reaches retail, food services or households directly (Eurostat, 2023a). Within the EU, households contribute to over half of the entire food waste production, accounting for 54%. Food manufacturing generates 21% of the total food waste, primary production and restaurants / food service each nine percent, and the retail and food distribution the remaining seven percent (Eurostat, 2023a). Causes contributing to food waste in private households encompass for instance:

- retail environments such as promotions like "buy one, get one free" which can encourage impulsive purchases and excessive buying
- misinterpretations of "best before" and "use by" date labels, resulting in the disposal of perfectly edible foods
- lack of proficiency in food management skills, including meal preparation, utilizing available food ingredients, and managing leftovers effectively
- inadequate shopping habits and meal planning (EC, n.d.)

Food waste represents a significant loss of resources, including water, land, energy, labor, and capital, and contributes significantly to greenhouse gas emissions (Zhu et al, 2023). Reducing food waste not only conserves resources but also has the potential to improve food security by redirecting food to those in need (FAO, 2023). Tackling food waste is therefore a vital component of creating more sustainable agri-food systems.

3.3 What tools to support the sustainability transition in agri-food systems

As this chapter has demonstrated, a growing body of scientific evidence shows the importance of agroecological and nature-based solutions combined with dietary change and reduced food waste as key elements of sustainability transition in agri-food systems. The awareness of these key elements and the need to address them at the same time is the starting point for policies to enable farmers to break away from overreliance on synthetic inputs, maximizing yields and economies of scale at all costs, and transition to farm in climate and nature friendly ways. Farmers need to overcome significant barriers to make this transition, barriers which directly emerge from the dominant agricultural model and other mechanisms and processes which mutually reinforce each other to favour the status quo in production and consumption patterns (Oliver et al., 2018, Frelih Larsen et al. 2023).

Typically, the lack of cross-sectoral coordination and interdisciplinary approaches has led to siloed thinking in policies, which is then itself a barrier to breaking down the multiple barriers and processes that are preventing the sustainability transition (Oliver et al., 2018). When policy efforts are fragmented and uncoordinated, this leads to their limited impact and effectiveness, or can even lead to undesirable outcomes. A coordinated and systemic approach is therefore needed to simultaneously pursue changes on the production and consumption side. On the production side, policymakers must address farmers' dwindling economic position in the agri-food supply chains, lacking incentives to take up alternative ways of farming, as well as lack of knowledge, tailored advice, and research to support farmers in making the transition. The Common Agricultural Policy and the National Energy Action Plans (NECPs) are key instruments available to EU countries in this regard.

On the consumption side, food strategies, dietary guidelines, support for sustainable public procurement and development of markets for organic foods and plant-based foods are some key instruments to support the transition. This area of work has been more underdeveloped but is increasingly important to enable the sustainability transition.

In the following chapters, we zoom in to these areas. Specifically, we analyse to what extent the CAP and NECPs in CEE countries are already supporting the transition and what gaps exist (Chapters 4 & 5), and we outline some approaches that countries can make in supporting sustainable food consumption (Chapter 6).

4 Does the CAP support the transition to climate friendly and resilient agri-food systems in CEE countries?

4.1 Introduction

The CAP has the potential to serve as a key lever to guide the transition towards more climate friendly and resilient agri-food systems. Indeed, climate featured quite prominently as a topic already in the previous programming period (until 2021). However, this was not accompanied with effective support for climate action. Although a significant share of the CAP budget was dedicated to climate mitigation and adaptation objectives, it had very limited ambition and impact in reducing agricultural emissions (ECA, 2021).

Whether the current CAP has the potential to better support climate action depends on both the budget allocation to different interventions, as well as how well these interventions are designed.

In this chapter, we explore to what extent the CAP Strategic Plans (CSPs) in CEE countries support agroecological solutions, and whether they also contribute to the transition towards more plant-based diets, for example, by favouring either a transition from intensive livestock production to mixed systems or increases in sustainable plant production. Moreover, we examine the extent to which the CAP supports unsustainable systems or farming practices.

Box 2:

Methodology used in the analysis

The analysis of the CSPs is based on the original plans approved by the European Commission from the 11 CEE countries (see Annex 1 for the links to these Plans). Later amendments made to the CSP plans are not included to maintain consistency. Detailed information about sub-interventions, including eligibility criteria, supported activities, planned outputs, and financial allocations was extracted from machine translated copies of the original documents and organized into a structured database. To facilitate the analysis, we categorized the different types of measures into 18 categories[1]. Data on budget allocation at intervention-level, and specific output targets were sourced from the publicly accessible Data dashboards (EC, 2024a). All budget figures are presented as total public expenditure, which means that both EU funds and national contributions are included. The budget calculations include all intervention types except for sectoral interventions, which together account for only 0.81% of the overall CAP budget, differ between countries due to regionally distinct sectoral structure and therefore have a minor implication for the analysis.

The analysis of the published documents was accompanied with expert interviews to gather better insights into the design and likely implementation challenges. A quantification of potential mitigation impacts of selected measures was also conducted.

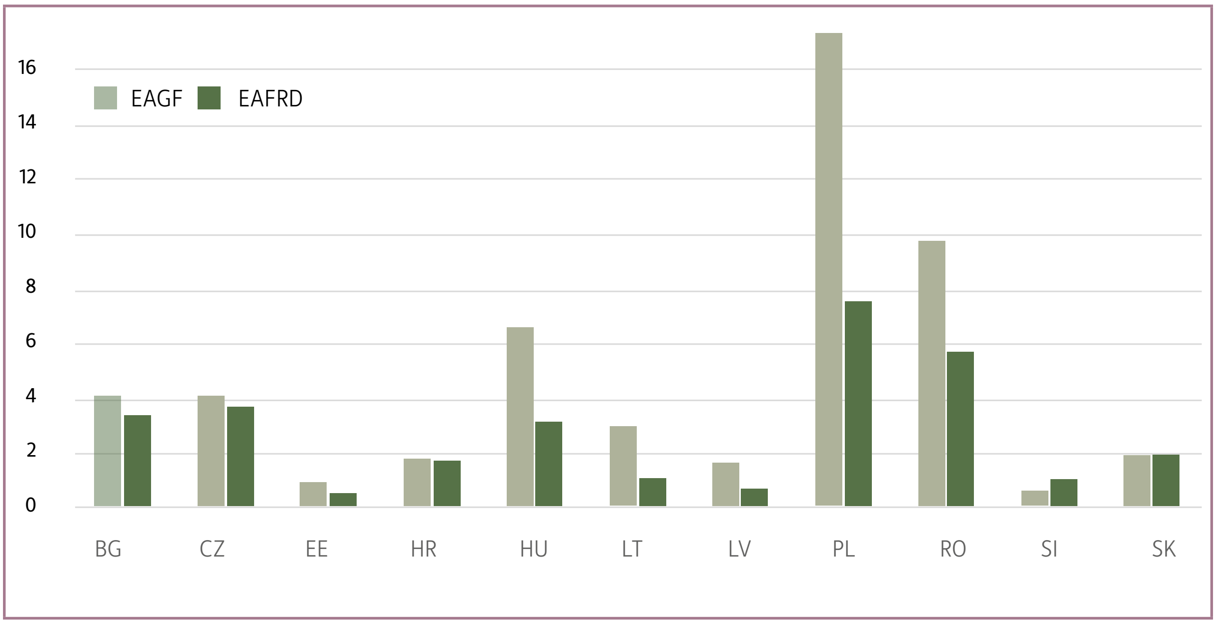
The results are presented as follows. First, we look at the allocation of the CAP budget in different countries, reflecting on what this allocation says about the support available for measures supporting transition to climate friendly and resilient agriculture. In section 4.3, we look at the different aspects of the design of interventions. In section 4.4. we present the results of a quantification exercise, where a calculation was made of the potential positive mitigation impact of selected interventions implemented in CSPs. Finally, the chapter concludes with a reflection on key messages around the potential and gaps as shown in the CSPs.

1 Agroforestry, animal welfare, beekeeping, biodiversity, crops & varieties, cropland management, extensive grassland, forestry, genetic resources, grassland management, integrated production, irrigation, landscape features, manure & fertilisation, organic farming, peatlands, cropland management, whole farm eco-scheme

4.2 Climate ambition as reflected in the budget allocation

The total CAP budget for CEE countries amounts to 83,27 billion EUR for the 2023 – 2027 period or 28% of the total CAP budget in the EU[2] (EC, 2024a). Funding comes from two funds: the European Agriculture Guarantee Fund (EAGF) and the European Agricultural Fund for Rural Development (EAFRD). Although the budget available per hectare of UAA is somewhat lower than in EU-16 (1.660 EUR per ha compared to 1.918 EUR per ha), the total budget available still means that the CAP is a key decision-making influence for farmers in CEE countries (see Figure 8).

Figure 8: Total CAP public expenditure (billion EUR) and overview of UAA/country (1000ha)



Country	BG	CZ	EE	HR	HU	LT	LV	PL	RO	SI	SK
UAA 2022 (1000 ha)	5.022	3.530	986	1.448	5.081	2.911	1.970	14.198	12.678	479	1.849

Source: EC, 2024a & Eurostat, 2023b

The environmental and climate ambition can be seen foremost in the split of the budget between the two CAP funds, as well as the extent to which different interventions in each fund are supported. The EAGF is mostly used to support farmers' income, installation of young farmers and stabilizing agricultural markets, although green payments have increasingly been attached to this fund in recent years. The EAFRD is mostly used to increase the competitiveness of agriculture together with its environmental performance and broader support to rural areas and communities. The ratio of EAGF to EAFRD spending in the CEE region is practically the same as the EU average, with 63% of total agricultural spending going to EAGF and 37% to EAFRD. However, there are notable differences with Slovenia allocating 62% to the EAFRD, Slovakia, Croatia, Czechia, and Bulgaria approximately half, and Latvia less than 30%.

2 EU 27 total allocation = 295,01 billion EUR

Within predefined limits set at EU level for each fund, countries have the possibility to **transfer funding between the EAGF and the EAFRD fund.** Only four countries (SK, RO, LV, CZ) chose to transfer funds from direct payments to rural development, with the amounts ranging from 1 to 5% (EU27 average: 4,6%). Poland, Hungary, and Croatia transferred funds in the opposite direction, with HR transferring only two percent, but PL and HU a very significant share (29% and 23% respectively, compared to EU27 average of 3,9%) (EC, 2023). This results in a significant cut to EAFRD funding, which enables support for more targeted and ambitious environmental and climate measures.

Decoupled income support (or hectare-based income support) accounts for more than a third of the total CAP budget (EAGF + EAFRD) in CEE countries (38%[3]). This includes three interventions: basic income support for sustainability (BISS), complementary redistributive income support for sustainability (CRISS) payments, and income support for young farmers (CIS-YF). Decoupled income support has been heavily criticized as the payments tend to be unevenly distributed (farmers with more land get more money) and they pass-through into land rental prices (Baldoni & Ciaian, 2021; Pe'er et al., 2019), including to non-genuine farmers (e.g. investment holdings). The environmental conditionality for the payments is weak, and has been further weakened by derogations, withdrawal, or reduction in requirements for GAEC standards that have occurred in 2023/2024.

Degressivity and capping of basic income support payments (BISS) allows Member States to reduce or cap the BISS payments above a certain ceiling and transfer the amounts resulting from this to EAFRD. In general, this can result in a fairer and more targeted distribution of income support payments, especially if few farm entities within a Member State hold large agricultural areas receiving large proportions of the income support. Degressivity starts from > 60.000 EUR, and capping can be applied at > 100.000 EUR[4]. Four CEE countries have applied capping or reduction of basic income support payments (BG, LV, LT, SK), two countries also apply degressivity (SI, SK) (EC 2023). Other countries (RO, HR, HU, CZ, PL) which have some of the largest agricultural holdings in the region do not apply either of these two options, which means that CAP payments are even more concentrated in the hands of fewer holdings, heavily favouring large holdings and investors[5].

Coupled income support links the receipt of income support payments directly to specific outputs. While this coupling had been reduced over time to avoid overproduction, specific agricultural sectors are still supported with payments given out per animal or per hectare of land. In the current 2023-2027 there has been a minor increase in coupled support compared to the previous CAP, with most of this coupled support targeting the livestock sector (EC, 2022). The CEE countries allocate a higher share of their budget to coupled payments compared to other EU countries (EU-16), with almost 10% of the total budget in CEE countries going to coupled payments. Nearly two thirds of the coupled income support is allocated to livestock (63,5%).[6] Hungary, Lithuania, Poland, and Latvia have the highest share of coupled income support among the CEE countries allocating approximately 10% of their total CAP budget to coupled payments (Figure 9).

Eco-schemes are part of the EAGF and expected to address climate, environment, and animal welfare related objectives. The European Commission requires a share of 25% for the eco-schemes from the direct payments budget, unless more than 35% EAFRD fund is targeted to environmental, climate, and animal welfare and antimicrobial resistance. Eco-schemes account for the second single largest intervention, with the median of 15,8% of total CSP budget in CEE countries, although Slovenia stands out with a much lower allocation of 5,8%. The Baltic countries (LT, LU, EE) and Poland allocated the highest budget share to eco-schemes, between 17-18% of total CSP budget. The effect of eco-schemes is expected to be short term and therefore limited as the payment is on a yearly basis. Countries can use eco-schemes to test measures, to see farmers' response and to trial the design of measures. In principle, eco-schemes can be used as top-up payments for going beyond

3 Of total CEE budget: 29% BISS, 8% CRISS, 1% CIS-YF

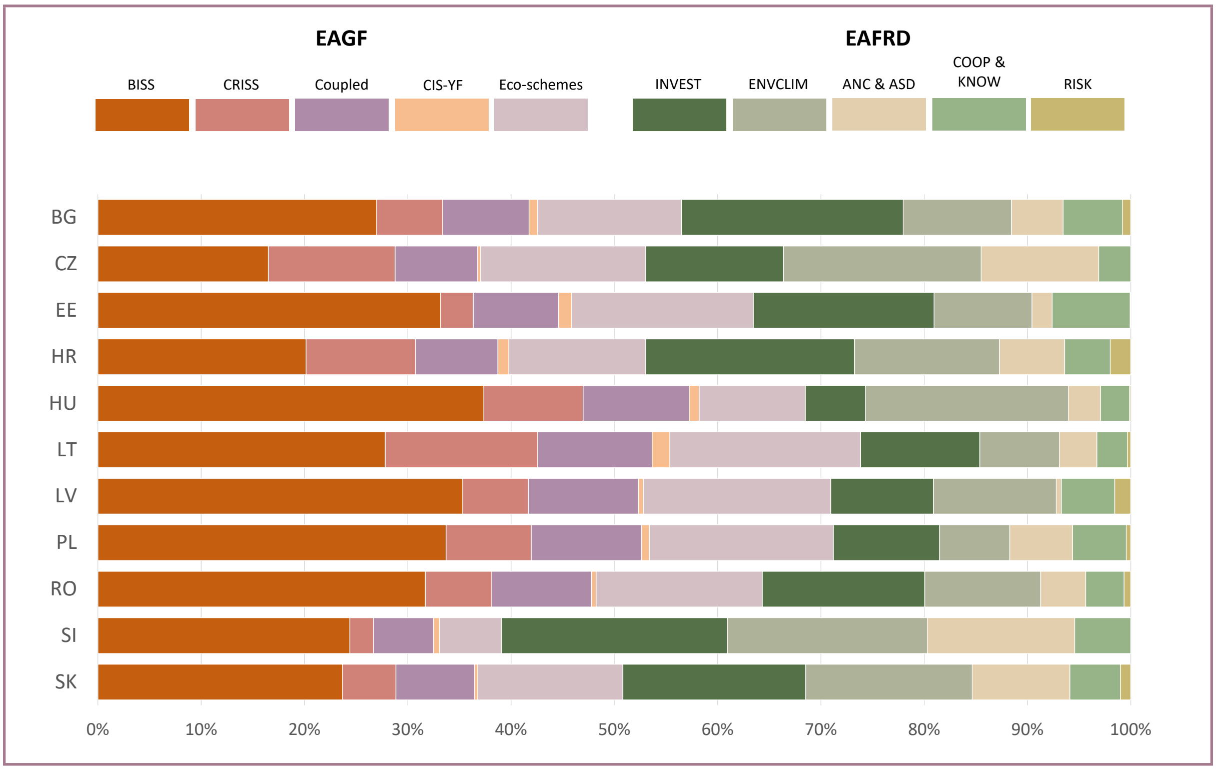
4 Member States may subtract from the amount of the BISS payment to be granted to a farmer in a given calendar year the labour costs linked to the agricultural activity of the beneficiaries (Article 17(3) of Regulation EU 2021/2115).

5 See, for example, https://www.iki.bas.bg/files/Doklad_2016_EN.pdf and https://www.arc2020.eu/wp-content/uploads/2021/03/where-does-the-money-go.pdf

6 Note that coupled payments only support ruminants, whereas pig and poultry sectors are not eligible for these payments.

GAEC requirements and could be made attractive by increasing level of payments over time. The significant derogations to GAEC requirements made in 2023/2024 mean that good design of eco-schemes is even more important for ensuring that farms achieve minimum environmental performance.

Figure 9: Total public expenditure (in %) for CSP interventions (2023 – 2027)



Source: Own calculations based on EC, 2024a.
Note: Not included in graph are sectoral interventions & technical assistance, accounting for less than 3% of total public expenditure.

Under the EAFRD, the largest share of funding in CEE countries is allocated to **investment measures** (35%). This is a higher share of the total CSP budget than in EU-16 countries (13% compared to 9,7%), reflecting also high priority given in CEE countries to productivity improvements. Most CEE countries have more than 10% of funding allocated to investments, with Bulgaria 20,8% and Slovenia 21,32% having the highest shares, and Hungary with 5,7% and Latvia 9,8% having the lowest shares. On the other hand, funding allocated to **cooperation and knowledge** interventions is limited, with most CEE countries below five percent, and the notable exception in Estonia with 7,4%. Although the average financial allocation is only slightly lower for cooperation and knowledge interventions, it appears very limited given the lower levels of AKIS development in CEE countries compared to EU-16 (EC, 2023). Green investment measures and cooperation/knowledge interventions are important because they enable and facilitate transition to different types of production and practices.

The interventions **Areas with Natural Constraint (ANC) and Area Specific Disadvantages (ASD)** are mostly designed to address farmers´ income support (EC, 2023), while contributing to climate and environmental targets. In the ANC intervention, countries can choose between different categories of land, such as areas facing natural constraints, mountain areas and other areas affected. In the ASD intervention, different types of land can be targeted, such as agricultural areas included in river basin management plans, Natura 2000 forest and agricultural areas and other nature protection areas with environmental restrictions. ANC and ASD payments account for 6% of the total budget in CEE countries, which is only slightly less than the EU average (7%) (see Figure 9). Slovenia and Czechia have the highest share of budget allocated to ANC and ASD, and Poland has the highest total amount of payments allocated. ANC and ASD have no environmental conditions attached except conditionality requirements, although countries can specify such requirements. Therefore, ANC and ASD interventions are largely non-targeted payments that can, but do not necessarily, support environmentally friendly practices. For example, in Lithuania ANC payments are also available in regions with the least fertile soils and high erosion risk, where some areas are under crop production, ploughed and seeded yet with limited yield due to reduced soil fertility. In these areas, payment requirements could be set in such a way as to support extensive grassland management and conversion from cropland to grassland, both of which would reduce erosion risk and have other environmental benefits.

Environmental, climate-related, and other management commitments (ENVCLIM) include measures aiming to strengthen environmental and climate ambition, organic farming, animal welfare, and forestry. Although they are the most targeted payments, they receive a small share of the total CAP budget. In total, they account for 11,7% of the total CAP budget in CEE countries, and approximately a third of the EAFRD payments. Of this, just under half (48%) is allocated to agri-environment-climate commitments (AECC), 34% to organic farming, and 18% to animal welfare (see Table 1).

There is variation among countries. Lithuania, for example, allocates almost all ENVCLIM budget to organic farming, Romania has the highest share of payments going to animal welfare, and both Romania and Croatia allocate a higher share to animal welfare payments than to AECC measures. Hungary focuses primarily on AECC measures, and Slovenia, Estonia and Czechia also allocate more than half of their ENVCLIM budget to AECC measures. Poland and Latvia do not make use of the animal welfare intervention under ENVCLIM.

Table 1: Budget allocation to ENVCLIM interventions

MS	Agri-environment-climate*	Organic farming	Animal Welfare	Total allocation in million EUR
BG	46%	47%	6%	773,68
CZ	53%	31%	16%	1.478,13
EE	55%	18%	27%	150,53
HR	21%	48%	31%	496,54
HU	78%	13%	9%	1.902,91
LT	7%	93%	0%	314,28
LV	29%	56%	16%	287,24
PL	45%	55%	0%	1.652,14
RO	34%	23%	43%	1.705,53
SI	56%	28%	15%	328,75
SK	36%	28%	36%	641,78
CEE	48%	34%	18%	9731,516

Source: Own calculation based on data derived from EC, 2024a.
Note: Cells with a higher share for organic farming or animal welfare than other measures are marked light orange.
(*this is the sum of O14, O15, O16 and O19, i.e. agri-environment-climate commitments for agricultural and forestry land, as well as genetic resources and afforestation/agroforestry).

Investments provide a major potential lever for guiding the transition to more climate-friendly and resilient farming, and account for nearly 11 billion EUR of CSP budget in CEE countries. However, the share of investments explicitly targeted at climate and environment investments remains limited, including for those nature-based solutions with the largest mitigation potential (agroforestry and peatland rewetting). The majority of the investments are dedicated to farm modernisation, digitalisation and rural areas/infrastructure (see Table 2).

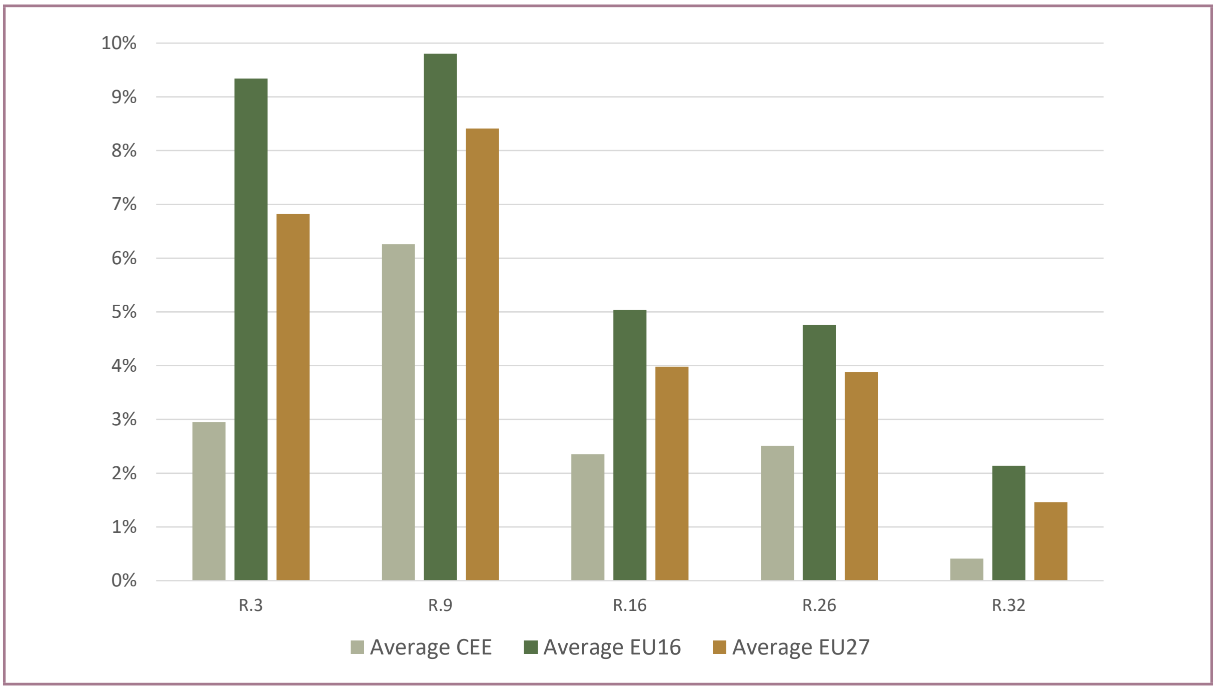
According to expert judgements of national priorities in the different countries, modernisation and productivity in agriculture remain key priorities for agriculture sector. While this is true for both EU average and CEE countries, it can be noted that the share of farms benefiting from investments is significantly lower than the EU average (Figure 10). This reflects the different farming structure (larger number of smallholdings) in CEE countries, and also indicates that these investments are potentially driving agricultural restructuring in CEE countries.

Table 2: Budget under Investment measures in million EUR

Country	Modernisation	Rural area/ infrastructure	Irrigation	Forestry	Afforestation	Agro forestry	Climate	Environment/ Biodiversity	Other	Total
BG	547,9	673,8	100,0	41,0	20,0			201,1		1.583,8
CZ	608,1	57,8		166,7	0,9	3,9	80,0	111,6		1.029,1
EE	203,5	15,0		8,0				51,4		277,9
HR	443,1	75,9	72,4	71,6			30,0	20,4		713,3
HU	295,4	98,0	17,2	73,2			48,3	19,9	9,6	561,7
LT	338,0	21,1	40,0		7,0		56,3	4,0	5,0	471,3
LV	114,0	56,0		9,4			37,0	3,0	20,5	239,9
PL	790,2	677,0		18,0	11,6	6,0	267,7	353,5	379,1	2.503,1
RO	1.330,2	451,0	502,4					98,4	10,0	2.392,0
SI	273,9	9,0	20,6	36,8			17,1	10,0		367,3
SK	520,0		32,0	30,0	0,3	3,3	30,0	88,8		704,4
Total	5.464,2	2.134,5	784,5	454,7	39,8	13,3	566,4	962,2	424,2	10.843,8
Total share of INVEST	50,4%	19,7%	7,2%	4,2%	0,4%	0,1%	5,2%	8,9%	3,9%	100%

Source: own calculation based on data derived from EC, 2024a.
Note: Other contains measures such as investments in: animal welfare, disease prevention, non-agriculture activities or disaster mitigation.

Figure 10: Share of farms benefitting from the investment intervention



Source: Own depiction of data derieved from EC, 2024a, Note: R.3 Digitalising agriculture; R.9 Farm modernisation; R.16 Investments related to climate; R.26 Investment related to natural resources; R.32 Investments related to biodiversity.

Summary:
The majority of the CSP budget is allocated to the EAGF payments, which have weak conditionality requirements (decoupled, coupled payments) or include voluntary one-year commitments (eco-schemes). The GAEC derogations and weakening put in place in 2023/2024 further reduce the environmental performance of this fund. Targeted environmental and climate payments under EAFRD make up a minor share of the total CAP budget. Moreover, both coupled payments under EAGF and investment support under EAFRD, which together add up to 22% of the total CSP budget (or 18,6 billion EUR), potentially contribute to further intensification of production in the livestock sector and can thus have perverse effects in terms of climate goals. The lack of introducing degressivity and capping instruments in countries with large holdings leads to an unfair and unproportional distribution of income support towards large holdings.

4.3 Climate ambition as reflected in the design of interventions

4.3.1 Weak conditionalities hinder large scale adoption of climate friendly agroecological solutions on grasslands and arable land

Good agricultural and environmental conditions (GAEC) standards set minimum requirements which farmers must comply with to receive EAGF payments. Several GAECs aim or have the potential to preserve and enhance soil carbon stocks and reduce emissions in arable and grassland systems. However, country choices of specific design do not maximise the opportunities offered by these conditionalities. In addition, the adoption of amendments to the CAP regulations in April 2024 significantly weakens requirements set at EU level, both at individual GAEC levels (as described below) and across all GAECs[7]. Cross-cutting amendments include the possibility for Member States to exempts farms of a size up to 10 ha (65% of CAP beneficiaries) from controls and penalties regarding GAEC compliance. In addition, Member States can implement temporary derogations due to extreme weather.

7 The fast-track process leading to these derogations has been questioned by civil society stakeholders. See, for example, https://www.arc2020.eu/confidential-legal-advice-on-cap-fast-track-uncovered-critique-of-a-meek-opinion/

Conditionality does not effectively prevent the ploughing of permanent grassland and thus loss of soil carbon stocks.

GAEC 1 aims to preserve permanent grassland through limits sets on converting permanent grassland into other agricultural land uses, such as arable or permanent crops. By protecting permanent grasslands, the GAEC can have a significant role in preserving soil carbon stocks. The GAEC 1 allows a maximum five percent decrease in the share of permanent grassland in relation to the total agricultural area based on the reference year of 2018. The scale at which the ratio applies may vary between countries. The conditionality has been in place with certain modifications since 2005.

Our review shows that the potential of GAEC 1 is highly affected by the definition of permanent grassland and the restrictions in place. In 10 out of 11 CEE countries permanent grassland can be ploughed and/or reseeded while remaining permanent grassland. Only Lithuania prohibits ploughing of permanent grassland. Czechia permits ploughing if this is done to restore the grassland. Estonia allows the renewal of permanent grassland with reseeding.

Furthermore, all CEE countries chose to apply GAEC 1 at national level. Most chose to allow up to a five percent decrease of the annual ratio as compared to the reference ratios before they are obliged to take corrective measures, which is in line with the greening commitment under the previous period (EC, 2023). Hence, land use change in different parts of a country remains possible as long as the average does not go beyond five percent. Therefore, GAEC 1 will restrict some land use change, but when applied at national level it does not effectively preserve the most valuable grasslands because these can still be lost. In Lithuania, the decrease of grasslands has shown worrying trends, and has reached the five percent threshold several times. However, following farmers' protests the country negotiated to have the methodology adjusted so that the threshold has not been exceeded. This shows a worrying response as it sets a precedent: if farmers do not want to restore grasslands, protests will achieve this goal. In March 2024, the Commission proposed a change in rules to give all Member States more leeway when applying the five percent requirement for permanent grassland[8].

GAEC 9 bans the converting or ploughing of Environmental Sensitive Permanent Grassland (ESPG) in Natural 2000 sites. GAEC 9 mainly has a biodiversity objective, but it can potentially also contribute to climate mitigation and the preservation of natural resources by protecting soils from ploughing and erosion risks and related benefits for water quality and quantity. As part of the GAEC implementation, Member States are required to determine the area of permanent grassland within their Natura 2000 areas which are considered environmentally sensitive.

In general, the impact of this standard on climate mitigation is limited and difficult to quantify, and the effectiveness of the standard depends on the scope of ESPG defined by the Member States and the conditions of the Natura 2000 Network in the respective countries. Habitats are more likely to have a good conservation status, if they belong to a Natura 2000 network. However, they may still be mismanaged, over-exploited or abandoned (Nemcová & Nyssens-James, 2022).

Member States provide an indication of the number of hectares that will be protected as ESPG through GAEC 9. Several countries have qualified all permanent grasslands in Natura 2000 sites as ESPG. For most of the CEE countries the area of ESPG covered under GAEC 9 remains similar compared to the previous period. Only in Estonia and Slovenia considerable differences can be noted with an increase of the ESPG area under GAEC 9 (EC, 2023).

The EU rules do not address ESPG outside Natura 2000 sites, although Member States can designate such ESPG. Latvia, as one of the countries with large areas of grassland outside of Natura 2000, uses this possibility for permanent grassland outside of Natura 2000 sites.

8 In April 2024, the EP approved the proposed modification, which at the time of writing still must be approved by the Council.

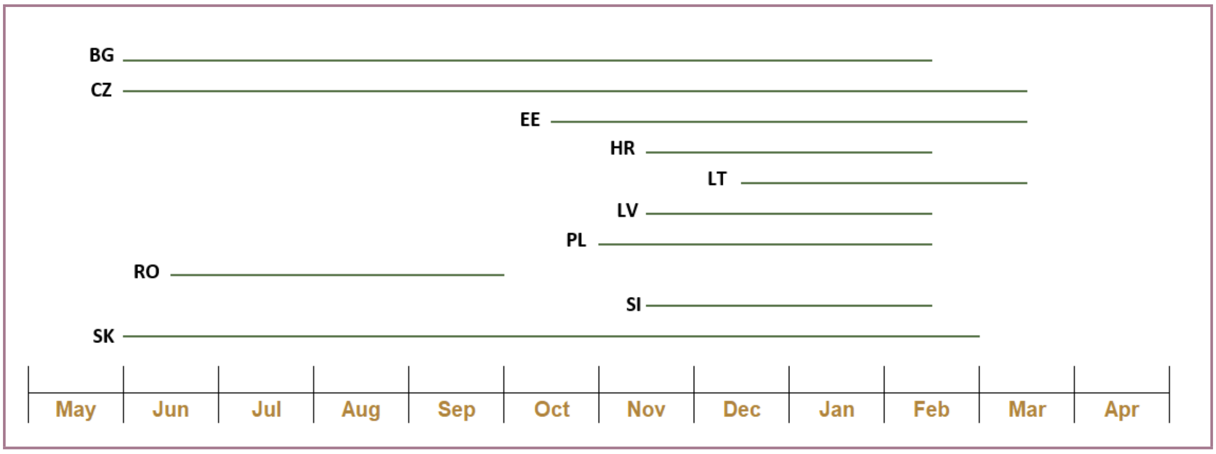
Conditionalities on soil management do not sufficiently support soil carbon maintenance and sequestration on mineral soils in arable systems.

Three GAECs are particularly important for climate performance with respect to arable land as they contribute to protection against soil erosion and to preservation of carbon stocks.

GAEC 5[9] on tillage management requires that Member States define tillage management practices and areas at risk for soil erosion based on factors such as slope, soil type, land use and climatic conditions. All CEE countries apply GAEC 5 on arable land and permanent crops. Several criteria are important for identifying areas at risk for soil erosion, but slope is the most important. All 11 CSPs except two (SK and CZ) indicate that they use slope gradients to define areas at risk of erosion. BG, EE, and SI apply a minimum slope gradient of 10%, whereas HU, HR, LT, LU, PL and RO use 11-15%. Another relevant criterion is field size as field boundaries can intercept eroded soils. However, none of the reviewed countries refer to field size, including SK and CZ where arable farmland is characterized by large field sizes. These definitions therefore limit the total area that the GAEC 5 applies to, and thus its potential impact.

GAEC 6[10] on minimum soil cover has the objective to prevent bare soils during critical and most sensitive periods, thereby helping to prevent soil erosion and to protect soil carbon stocks (EC, 2023). All CEE countries apply the standard on arable land and permanent cropland. However, in most CSPs, the standard applies on a part of the holding's area, based on criteria such as erosion risk, slope, type of soil and type of crops, or applies to a certain share of the arable land or permanent cropland of a holding (e.g. 30% of arable land in Bulgaria, 80% of arable land in Slovakia). Three CEE countries have also reduced the spatial coverage of the GAEC compared to the previous funding period (BG, EE, LT).
With regards to the definition of sensitive periods, Slovakia sets the longest period establishing a summer and winter soil cover (see Figure 11), whereas Latvia has reduced the length of the period with regards to the previous funding period.

Figure 11: Soil cover sensitive periods on arable land defined in GAEC6



Source: Adapted from EC (2023), Note: no data for HU

The GAEC 6 does not consider the degree of soil cover, even though this is a key determinant of soil erosion risk. Soil erosion is significantly reduced when soil cover is above 25% (BMEL and BZL, 2022). The rougher the floor surface (through soil cover, crop type, etc) the lower the risk of soil erosion.

9 GAEC 5 originates from the cross-compliance GAEC 5 on minimum land management of the previous period. Therefore, Member States had already established specific requirements on minimum land management, considering different land uses (arable, grassland, permanent crops, other), slope gradient and tillage practices. However, some regulatory changes have been implemented.

10 GAEC 6 originates from the greening requirement GAEC 4 on minimum soil cover of the previous period. Therefore, MS had already established specific requirements on minimum land management, considering different land uses (arable, grassland, permanent crops, other), slope gradient and tillage practices. The new GAEC is more explicit to set minimum soil cover standards to avoid bare soil in periods that are most sensitive (EC 2023).

The definition of the type of soil cover and the sensitive period alone are not sufficient.
Together, the fact that GAEC 6 only applies to a part of the holding area and does not include the degree of soil cover limits its positive impact and effectiveness.

GAEC 7 on crop rotation on arable land aims to preserve the soil potential (maintaining healthy soil structure, chemical content and fertility, and soil organic matter), except for crops growing under water. Crop rotation involves alternate crops grown on a specific field in a planned pattern or sequence in successive crop years so that crops of the same species are not grown without interruption on the same field (EC et al., 2024). Countries have the possibility to define main and secondary crops.

CEE countries make full use of the flexibility in defining requirements and criteria under this GAEC. Most of the CSPs allow the main crop to be grown on the same field for more than one year (nine of 11 allow maximum of three years). Only Slovakia requires a rotation every year, Croatia does not give any requirements. BG, CZ, HU, LT, LV, and PL require a minimum share of 30% to 50% of the main crop grown on the holding area to be rotated every year. Only EE, RO and SI require above 50%. For HR and SK no minimum share has been defined. Overall, none of the CEE countries apply meaningful crop rotation standards, but rather a mixture of crop rotation and diversification.
Due to the Russian invasion of the Ukraine and the following narrative around EU food security being at risk, the EU Commission offered Member States the possibility to derogate from GAEC 7 in 2023. Furthermore, with the amendments adopted in April 2024 by the Council and the Parliament, Member States can exempt certain crops, soil types or farming systems from requirements on tillage, soil cover and crop rotations under GAEC 5, 6 and 7. They can also choose to comply only with crop diversification requirements under GAEC7.

Exemptions and derogations currently limit the potential of GAEC 8 that supports non-productive landscape features.

GAEC 8 aims to maintain 'non-productive' features and areas to improve on-farm biodiversity. The definition of non-productive features is wide and include features such as hedgerows, buffer strips, isolated trees, ponds, terraces, nitrogen-fixing crops, and land lying fallow. The conditionality has mainly a biodiversity focus, but also contributes to climate mitigation and climate resilience. For climate mitigation, the main contribution comes from avoided N2O emissions by not using fertilizer on non-productive areas, and from maintaining the carbon stocks in the above and below ground biomass. For climate resilience, non-productive features can, for example, reduce the risk of soil erosion and improve microclimate conditions.

The standard includes several elements and exemptions that countries can chose from, and the effectiveness is highly dependent on the decisions made by countries with regards to these elements and exemptions. The main relevant elements for climate are: 1) exemptions on non-productive area requirements, 2) the minimum share of agricultural area, and 3) the derogations offered by the EU Commission. Countries can choose to apply exemptions for the non-productive area requirements[11]. Most of the CSPs make use of the exemptions to exclude farms below 10 ha, which, depending on the farm structure in the country, can make up a significant amount of UAA. Overall, 76,4% of farms are below 10 ha in the EU, which shows that most EU farms are excluded from compliance with GAEC 8 (EC, 2023). Within CEE only Estonia is not applying this exemption. However, Estonia makes use of the forest exemption[12], which effectively excludes a large proportion of farms from GAEC 8.

11 a. Where more than 75% of the arable land is used to produce grasses or other herbaceous forage, is land lying fallow, is used for cultivation of leguminous crops, or is subject to a combination of those uses. b. Where more than 75% of the eligible agricultural area is permanent grassland, is used to produce grasses or other herbaceous forage or for the cultivation of crops under water either for a significant part of the year or for a significant part of the crop cycle or is subject to a combination of those uses. c. With a size of arable land up to 10 hectares.

12 Holdings in areas dominated by forest can also be exempted, provided that: 1) more than 50% of the total land area must be covered by forest; 2) the ratio between forest and agricultural land must be greater than 3:1; 3) the holdings must be in areas identified as areas facing natural constraints.

With regards to the definition of the minimum share of agricultural area to be devoted to non-productive features, countries have three different options:

- **Option 1:** 4% non-productive features on arable land[13]. This is applied by EE, SI and LV.
- **Option 2:** 7% to non-productive features on arable land under an enhance eco-scheme, in which case the share devoted to GAEC 8 (i.e. not compensated) can be reduced to 3%[14]. This is applied by HR.
- **Option 3:** Include catch crops or nitrogen fixing crops of at least 7% of arable land of which 3% shall be land lying fallow or non-productive features (not compensated)[15]. This is applied by CZ, HU, LT, PL, RO and SK.

BG offers all three options.

Overall, none of these three options are in line with the EU Biodiversity strategy for 2030[16] demanding "at least 10% of agricultural area under high-diversity landscape features". The inclusion of productive elements such as catch crops (option 3) which is applied by six out of 11 CEE countries, is not as beneficial for biodiversity compared to landscape features or land laying fallow.

Finally, by means of derogation, countries were offered to delay the implementation of the GAEC 8. In 2023, only Slovakia did not make use of this option. Following the adoption of the amendments to the CAP in April 2024, the minimum share for non-productive features is no longer mandatory. Countries that choose to remove this obligation are required to propose an equivalent eco-scheme so that farmers opting to implement the original GAEC requirements can be compensated (EC, 2024b).

4.3.2 The design of eco-schemes and ENVCLIM area-based payments requires improvements to better deliver on climate objectives

Area-based payments via eco-schemes and agri-environment-climate commitments are essential environmental interventions in the CSPs as they incentivize the adoption of agroecological practices beyond conditionality. Eco-schemes are annual payment schemes, so that farmers can switch in and out of commitments, and they can also use them as trial-and-error measures. Their application over a large area of agricultural land makes them crucial for mitigation and adaptation purposes. However, their typically low ambition limits their potential. ENVCLIM interventions are more targeted for long-term change due to multi-year payments and are usually with higher ambition. They have a key role in supporting a more permanent change in farming systems than the annual payments under eco-schemes. Their potential is limited by the much smaller area coverage and budget share allocated to them.

Overview of area-based farming practices supported by eco-schemes and ENVCLIM

Eco-schemes apply to a large area of agricultural land, which makes them highly relevant for the achievement of climate objectives. Four eco-scheme categories apply to a target area of more than five million hectares (Figure 12). Under ENVCLIM interventions, only organic farming measures have a target area above five million hectares.

Eco-schemes mostly support, in terms of area targeted, cropland management practices. For mitigation purposes, eco-schemes focused on manure management and fertilization are also important. Indirect benefits for climate arise through the eco-schemes supporting biodiversity, both on arable land and in grassland systems.

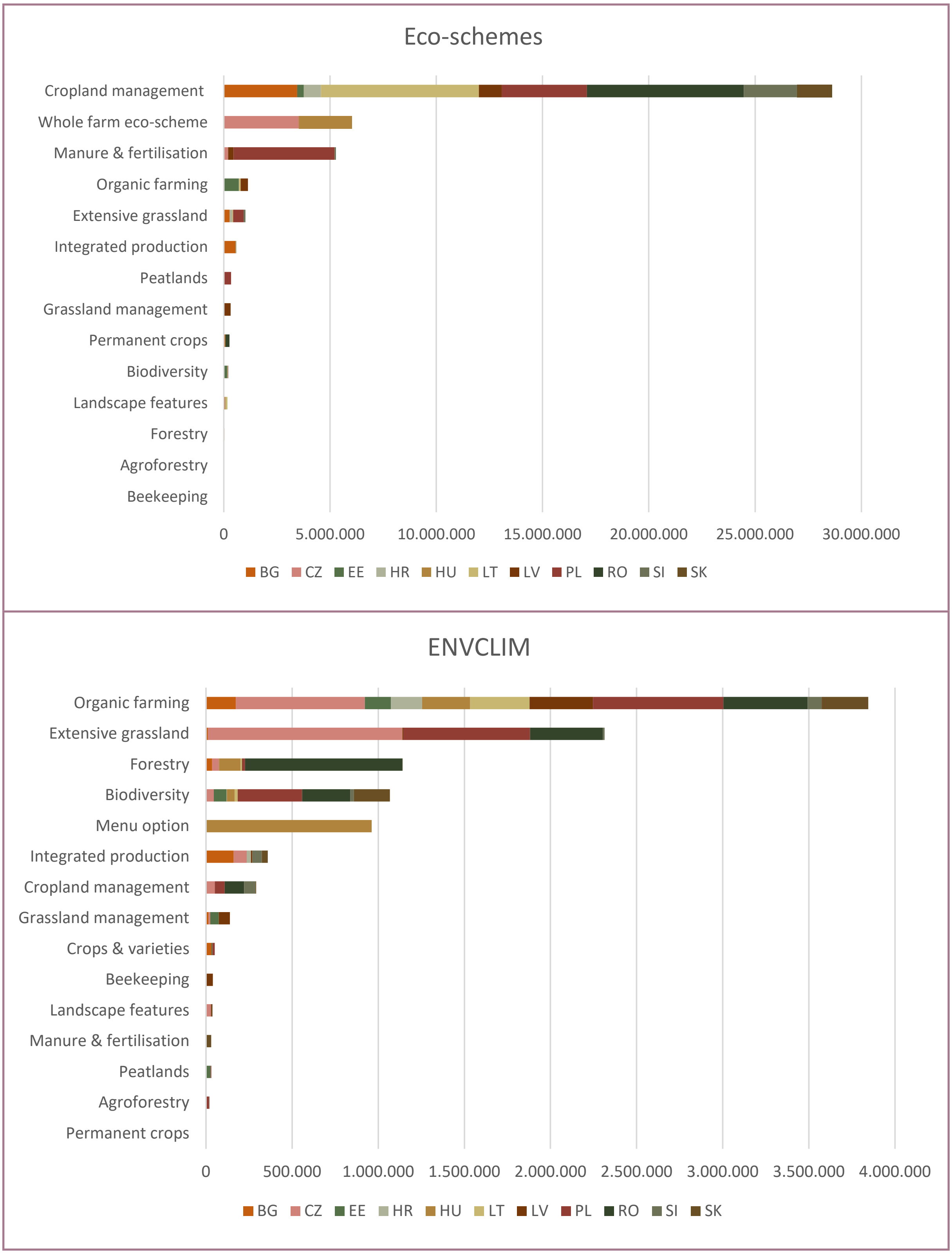
13 "Minimum share of at least 4% of arable land at farm level devoted to non-productive areas and features, including land lying fallow."

14 "Where a farmer commits to devote at least 7 % of his/her arable land to non-productive areas or features, including land lying fallow, under an enhanced eco-scheme in accordance with Article 31(6), the share to be attributed to compliance with this GAEC standard shall be limited to 3%."

15 Minimum share of at least 7% of arable land at farm level if this includes also catch crops or nitrogen fixing crops, cultivated without the use of plant protection products, of which 3% shall be land lying fallow or non-productive features. Member States should use the weighting factor of 0,3 for catch crops.

16 https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=celex%3A52020DC0380

Figure 12: Area targeted under Eco-schemes and ENVCLIM interventions (targeted area 2028, ha)



Source: Source: own calculations based on CSPs, Note for Eco-schemes: data for SI includes 2024 targets, for PL 2027 targets (2028 was not available for the analysis)

With regards to ENVCLIM, most area is dedicated to organic farming, support to extensively used grasslands, and grassland management. From our analysis it is not possible to say what share of organic farming area is dedicated to cropland management; however, the data on the structure of land use under organic farming can provide some orientation, suggesting that this varies among countries but is otherwise relatively balanced between grasslands and arable land (see Figure 12). Ambitious cropland management outside of organic farming receives much less support under ENVCLIM compared to eco-schemes. Forestry and biodiversity measures can also benefit soil organic carbon stocks. Peatland rewetting and agroforestry are hardly supported compared to other types of measures. The practices supported under these categories are discussed below under the discussion on design aspects.

The design aspects of eco-schemes and ENVCLIM measures in relation to arable and grassland systems are discussed below. Interventions focused on organic farming, livestock farming, peatland rewetting and agroforestry are discussed in separate sections.

Design of Eco-schemes

The four most relevant eco-scheme categories are cropland management, whole farm eco-schemes, manure and fertilization, and biodiversity. The other categories are hardly present in terms of area covered. Countries focus on a few selected categories with high target areas. Eco-schemes focused on cropland management account for the largest share of the targeted area by eco-schemes (See Figure 12 above)[17].

The eco-schemes that we categorized under cropland management focus on crop diversification, crop rotation (including the inclusion of legumes and other nitrogen-fixing crops) and catch crops. Other measures included are mulching, liming, no-till and retention of crop residues on the field. There is a wide variation in the target areas for specific practices as well as in the payment levels per hectare.

Most eco-schemes focus on **crop diversification** rather than improved crop rotations. Cultivation of different crops on the same field can contribute to improved soil structure and the cultivation of legumes increases soil organic carbon. However, genuine crop rotations have a higher positive impact on soil health, reducing soil erosion and compaction, as well as breaking pest and disease cycles and thus reducing the need for synthetic pesticides. Bulgaria, Latvia, and Croatia offer eco-schemes on crop-diversification, where the requirements for the number of crops increase with increased area that is supported (for example, with 10ha at least two different crops, 10-30ha at least three different crops, >30ha at least four different crops). Bulgaria also includes decreasing payments per hectare with increased area under commitment (for example, the bigger the field the more crops needed and the less payments per hectare). Estonia is the only country that offers a genuine crop rotation eco-scheme on arable land for cereal crops and vegetables.

Catch and cover crops are important measures to reduce GHG emissions, reducing soil erosion and nutrient losses (Smit et al., 2019). Several countries (EE, HR, LT, LV, PL, SI, SK) offer varying eco-schemes to support catch and cover crops using different eligibility criteria regarding the crop type, minimum area, and time period when they are grown. Payments per hectare are highly variable.

Other soil cover measures such as **mulching and retention of crop residues** are crucial in sustaining soil organic carbon and erosion control. They can easily be done on an annual basis. However, only few CEE countries support these practices under their eco-schemes.

Hungary and Czechia offer **whole farm eco-schemes**, where farmers can select from a menu of measures. Design aspects are especially important for whole farm approaches to avoid that farmers only choose simple measures that mainly create windfall effects.

17 A clear distinction between eco-schemes according to cropland or grassland management and other categories is not always possible, because some countries offer very general eco-schemes which include several different farming practices. When this is the case, we assigned the eco-schemes according to the best fit (i.e. depending on which farming practices were most prominent).

Slovakian whole farm eco-scheme focused on arable farming does not offer a menu of measures, but rather defines requirements that farmers must meet at the same time to receive the payment. Requirements differ according to the size, share of arable land and whether the farm is in a protected area. Effectively, the requirements relate to improving soil organic matter (with livestock manure, catch crops, composting, straw residue) and non-productive features beyond GAEC8 area. The overall uptake of the scheme is considered good, except in protected N2000 areas. In these N2000 areas, where the pressure on farmland birds is the highest because they are intensively management, the uptake is low among large farms (above 10ha) because the requirements are stricter, and payment levels do not appear to be sufficiently attractive to match these requirements. For example, the field size in these areas is set at maximum 20ha (compared to 50ha outside of protected areas) and the share of non-productive features is higher (3,5% beyond GAEC8 compared to 1% beyond GAEC8 outside of protected areas). There is very low enrolment in the most intensively managed N2000 protected areas.

Payment rates defined in eco-schemes may be insufficient for farmers to enrol in the scheme or select the most ambitious requirement. Romania, for example, offers an eco-scheme with three options on crop diversification, soil conservation, and landscape features, a high target area of above six million hectares, but with low uniform funding rate of 56 EUR per hectare. In contrast, Croatia offers an eco-scheme on conservation agriculture with several management options ranging from reduced tillage, crop rotation, catch and cover crops to integrated pest management. The target area is low with only 30.000 hectares, whereas the payment rate per hectare is above average with 250 EUR per hectare.

Poland offers a **carbon farming and nutrient management** eco-scheme based on a point system with significant area targets and a subset of different measures ranging from nutrient management plans, crop diversification, catch crops, manure management and the incorporation of crop residues (see Figure 12). Farmers can choose from different practices if they achieve a minimum number of points. Given that the payments do not vary, they would most likely focus on the least demanding practices with limited environmental impact, creating windfall effects. The calculation system appears complicated, and it is not clear how much the point system and the payment level reflect the environmental benefits of the practices.

Few eco-schemes reward **adapted tillage** measures such as no-till combined with direct sowing, reduced tillage, or strip-till. While the impact on climate mitigation is limited, adapted tillage is beneficial for soil health and climate adaptation (Powlson et al., 2014). However, the combination of no-till and pesticide use can be counterproductive (for example, Slovenian eco-scheme allows the use of herbicides “once”).

Extensive grassland eco-schemes are offered by five countries (PL, BG, CR, LT, SI) with a limited target area. The focus is on limits on livestock density, restrictions on mowing, grazing and the use of synthetic fertilizers, especially in less favoured areas. By this, these eco-schemes aim to support the extensive use of grasslands and the protection of biodiversity, supporting the maintenance of carbon stocks. However, the benefits are also highly dependent on the initial management and there are quite strong differences among the schemes. For example, Poland’s eco-scheme “Extensive use of permanent grasslands with stocking density” has very low ambition, only setting the limit of 2.0LU/ha for livestock density and prohibiting the ploughing of permanent grasslands, but there is no further restriction on fertilizer use or otherwise restrictions or incentives for extensive use of grasslands. Effectively, the only requirement that goes beyond the conditionality is the prohibition of grassland ploughing at farm level. In Croatia, on the other hand, three eco-schemes are offered for the protection of high value grasslands for three different types of regions (mountain, continental and mediterranean region), which is an interesting approach to integrate the regional conditions into such schemes and make them context specific. The requirements are much more restrictive than in the case of the Polish eco-scheme. The use of mineral fertilisers, manure, pesticides, seeding and hydro-melioration is prohibited, mowing is allowed only by hand or specific machinery, and stocking density is set between 0,3 and 1,0 LU/ha.
The eco-schemes offer few interventions on **manure management and fertilization**, including manure storing and processing, nutrient planning and fertilizer application including precision farming. Poland offers ambitious area targets for their eco-schemes on carbon farming and nutrient management already highlighted above. Latvia, Czechia, and Slovenia offer precision fertilization measures, which reduce nitrogen and ammonia emissions.

Slovenia also supports the use of nitrification inhibitors, and support for using only organic fertilisers in permanent crops. Although these measures can deliver mitigation benefits, they also require safeguards to avoid risks to soil health. For low-emission slurry application and nitrification inhibitors there are risks to soil health (Frelih Larsen et al., 2022).

Several countries include eco-schemes focused on **biodiversity** in agricultural landscapes. Poland has an eco-scheme that supports establishing areas with melliferous plants (at least two species of melliferous plants), prohibition of synthetic pesticides, and a ban on grazing and mowing before August 31st. This eco-scheme has a target area of 30.000ha hectares and relatively high payments per hectare. Lithuania offers two biodiversity measures for the establishment of short-lived flower stripes and perennial grassland stripes. The latter one is especially beneficial for nature conservation and climate change mitigation. Perennial grassland strips offer refuge and food for various animal species (mammals, birds, insects) during mowing period and beyond. However, both measures have a similar payment rate per hectare, which gives the wrong incentives to the farmers, making the multi-annual and more complex measure less attractive. Other measures offered by CEE countries include the designation of so-called Ecological Focus Areas, prohibition of synthetic fertilizer use, establishment of flower and grasslands strips and landscape features, restrictions on harvesting, mowing and grazing, support measures for bee harvesting areas, and protection of nesting areas. However, the area coverage for these eco-schemes is minor.

Landscape features are promising for climate mitigation, biodiversity, and natural resources; however, they have very low target area. The establishment and maintenance of landscape features usually involves high investment and maintenance costs. Therefore, payments per hectare are key to incentivize their uptake. Bulgaria and Lithuania offer eco-schemes for the establishment and maintenance of landscape features such as hedges, isolated trees and tree lines and buffer strips with high payment levels per hectare which potentially makes them interesting for farmers. A well-designed combination between longer term ENVCLIM measures, short term eco-schemes, and non-productive investments are especially important for complex and longer term measures, such as the establishment and maintenance of landscape features. There is both room for significant increase in ambition and for improved design/combinations of measures to better support landscape features.

Design of agri-environment-climate commitments (AECC)
Agri-environment-climate commitments include area-based payments under ENVCLIM interventions, excluding organic farming (the latter is addressed further below). The majority of AECC payments target different types of grassland management, whereas measures focused on arable land are limited. We identified three main types of categories of measures: extensive grassland, grassland management, and biodiversity management (relating to both grasslands and arable land).

Extensive grassland has the highest target area under AECC. The focus of the measures is on maintaining low-intensity usage of grasslands, through limiting livestock densities, requirements about timing of mowing or grazing, or support for seasonal grazing and grazing with specific breeds of animals. In this way, they support extensive use of grasslands and their biodiversity. These measures can be valuable for maintaining biodiversity. In countries which have predominantly arable sectors, large holdings and large field sizes, support for extensive grasslands can provide important benefits. For example, in Slovakia, agriculture sector is dominated by very intensive large holdings specialized in three crops – cereals, corn and rapeseed. This high specialization is accompanied with a general decline in more extensive livestock in less productive areas, so that most livestock production which is left is dairy cows in indoor housing. Similarly, in Lithuania, conversion from arable land to grasslands carries important mitigation and adaptation benefits. In this context, support for grazing is also considered important as a way of maintaining grassland biodiversity.[18]

18 See, for example, https://broz.sk/en/projekty/restoration-of-drought-loving-herbaceous-communities-in-the-contact-area-of-the-pannonian-and-alpine-bioregions/.

However, the design of extensive grassland measures is not necessarily optimal. In Slovenia, for example, several sub-interventions, require minimal mowing and limit fertilization with synthetic fertilisers. From a biodiversity perspective, in terms of maintaining species rich meadows or supporting key bird species, these are considered to have limited value. Their main climate benefit is avoidance of synthetic fertilisers; however, it is questionable whether this is really an additional requirement that is not already a standard practice and would have occurred even in the absence of the payment.

Grassland management includes practices and obligations relating to more intensively used grasslands, either temporary or permanent grasslands, with support for practices such as reduced soil treatments, species-rich grass mixtures, or limited fertilization and restrictions on fertilization techniques (e.g. slurry application). Bulgaria, Czechia, Estonia, Hungary, and Latvia offer such AECC schemes. Some CSPs also include support for conversion of arable land to grasslands. These interventions are highly relevant for maintaining and increasing carbon stocks, and in general improving soil health. Introducing grass or flower strips or converting from arable to grasslands can also have important benefits for preventing erosion and improving water quality. To ensure their uptake and impact increase in budget and target area would be needed.

Biodiversity measures target the nature conservation value of specific habitats or specific bird, plant, or other animal species, either on grasslands or on arable land (for example, Crex crex or specific species of butterflies). These are the most targeted and well-developed biodiversity protection measures. There are numerous good **biodiversity** measures under AECC ranging from support for breeding grounds, maintaining, and restoring high nature value grasslands, establishment of perennial flower strips, or also restrictions on grazing and mowing, or ploughing on arable land. By protecting valuable habitats, they also directly or indirectly support the maintenance of carbon stocks. Similarly to extensive grassland management, they usually also require some reduction in fertilizer use. These measures are very important to reach biodiversity targets, however, payment levels, limited budget and limited target area reduce the potential impacts from these measures.

Cropland management under AECCs has a much more limited target area and more limited share of funding overall. Arable land is primarily targeted by eco-schemes or by organic farming, to the extent that support for organic farming includes arable land. In Slovenia, for example, arable land under organic farming is very limited (2,7%). The design of agri-environment-climate measures on arable land is also not optimal. For example, the Slovenian AECC measure "Maintenance of crop rotation" has very limited ambition, with much of its funding allocated to the least effective crop rotation which is minimally different from crop rotation requirements from another AECC measure on integrated production. This lowest tier still allows maize to be included three times in a five-year rotation. Only the most ambitious tier under the crop rotation includes legumes but remains with very limited share of funding. This measure would be strongly improved to support ambitious crop rotation by removing Tiers 1 and 2 and dedicating the funding solely to Tier 3. Moreover, by targeting it to areas at high risk of loss soil in north-east part of the country, its effectiveness would be improved.

Box 3:

Hungarian Menu Approach under the AECC intervention

Hungary uses a so-called 'menu approach' in their AECC. AECC includes horizontal measures and more demanding and spatially targeted management prescriptions (zonal measures) that can earn the farmer additional points, which in turns makes their application ranked better and increases the chance of receiving payment. All areas are eligible for horizontal schemes, but zonal schemes are spatially limited, primarily to high nature value (HNV) areas. Some measures are also focused on drought areas or areas with frequent temporary water surfaces. Farmers have shown low interest in zonal measures outside of HNV area, as well as non-productive investments. Increasing payment levels provided by zonal schemes and non-productive investments, as well as building appropriate advisory support may enhance the willingness of farmers to join higher level commitments.

Horizontal AECC measures contain few compulsory, but a large number of additional / voluntary options. Most farmers will select at least some additional measures, but they tend to focus on those which are the easiest to implement with limited environmental focus. Advisors tend not to be proactive in encouraging farmers to choose the more demanding options due to the complexity of the implementation and the higher risk of controls by paying agency. The inclusion of low-demanding prescriptions in the agri-environment-climate schemes is problematic in the sense that this leads to windfall effects because farmers already choose measures with the lowest ambition and thus limits the environmental impact of the scheme. For example, in the case of the horizontal arable land sub-measure, farmers can comply with not using a list of prohibited chemicals, include some soil sampling and nutrient planning based on soil sampling, or also use con-trolled seeds. The latter has no environmental impact.

Of the more targeted arable measures in the Hungarian menu approach, most of these focus on bird species protection. This reflects the longer work done by nature conservation organizations in collaboration with management authorities. The design of these measures is also considered to be of good quality, with the limitation mostly posed by available funding. However, the targeted measures that focus on drought, or water management, are not considered to be designed well.

Although it is seen that the scheme needs to be further improved to remove deadweight measures and increase interest in targeted arable measures, the general approach taken is considered to offer farmers more flexibility.

Source: expert interview

Well-designed ENVCLIM area-based interventions can support a range of different agroecological practices from field to landscape level, contributing to longer term system change, while leaving the space for trial-and-error with a clear improvement pathway. However, the limited budget, area targets, as well as some shortcomings in the design of measures currently limit their potential to support transition to climate friendly and resilient agriculture.

4.3.3 Investments and advisory support for agroecological practices need to be strengthened

Investments

Investments that support climate mitigation, biodiversity protection and natural resource management objectives are an essential support tool for the transition towards climate friendly and resilient business models. Decisive is a well balanced combination between investments and area-based interventions to cover the entire measure portfolio, including the establishment and maintenance of practices, training and advisory services, while avoiding double funding. The budget for environmental and mostly non-productive investment interventions on croplands and grasslands in CEE countries (see Table 4) accounts for 800 million EUR total public expenditure. This is significant, yet represents a limited share of the total investment budget in CEE countries (14,1%).

Poland offers a broad and well-funded investment scheme for environment and climate, which can support farmers in their transition, including mandatory trainings on the sustainable management of natural resources. However, the investment scheme involves soft and unclear requirements, which potentially also leads to misplaced investments.

Latvia offers an interesting investment scheme for the restoration of high valuable grasslands, especially in Natura 2000 sites. In their CSP Latvia states that «more than half of grassland habitats are of poor quality due to inadequate management. Therefore, greater efforts are needed to restore and manage grassland habitats by involving private landowners». The scheme supports purchase of material, machinery, infrastructure facilities, project design, as well as planning and advisory services. Croatia offers a broad investment scheme for nature protection on arable land including several sub-measures, ranging from the investment for the establishment of landscape features such as terraces, stone walls and hedges, for wolf protection measures such as electric fences, herd protection dogs and buildings, and for the restoration of habitats.

Advisory support

The importance of good advisory support cannot be overstated. Good design of measures combined with timely and sufficient advice can strong increase interest and uptake of agroecological practices.
The lack of advisory support was raised as a barrier to increasing interest and uptake of ambitious measures under eco-schemes and ENVCLIM. For example, in Hungary, there is strong support available to farmers to move from extensive to intensive production, with many skilled and motivated advisors available. There is also support that farmers receive from agro-chemical companies. On the other hand, there is very little support available to moving from most intensive to less intensive production. Similarly, in Slovenia there are only two full-time equivalents in the state sponsored advisory services to support organic farming.

There are already good examples that can be learnt from and built on. In Hungary, for example, a system for nature conservation advice is set up via regional bodies, which provide advice to farmers in high nature value areas, from offering basic information on different measures to supporting them during implementation. The advisors are coordinated by Ministry of Agriculture and there is a clear correlation between strong advice and uptake of measures. Advisors are involved in the whole process, from scheme design, to support for implementation, as well as in on-the-spot control procedures so that they can support the controller in analysing if there are problems. These advisors are sometimes also involved in environmental monitoring.

In Slovenia, the main nature conservation NGO is involved in supporting the implementation of the eco-scheme »Protection of lapwing nests«, by helping to identify nests in the target areas. The locations are sent to the Payment Agency, which informs the farm advisors who then support farmers. Advisors, ornithologists and farmers together look at the specific sites, which have to be protected until mid-June. This and another eco-scheme were designed with the help of an EIP pilot project, which also tested how to best organise communication between researchers, advisors and farmers.

Increasing availability of pilot project to test different approaches, and providing sufficient funding for advice not just for nature conservation but also agroecological practices more broadly to increase interest and uptake are important steps to increase uptake and effectiveness of AECCs.

4.3.4 Coupled payments account for a large share of the budget, predominantly supporting livestock production without clear requirements or limits on intensity, animal welfare, or environmental performance

Coupled income support is predominantly used to directly support livestock production, with livestock related payments accounting for two thirds of the budget for coupled payments. This translates into a situation, where nearly a third of the livestock units in CEE countries receive coupled payment support. At the same time, coupled payments dedicated to fodder and protein plants also mostly and directly support the livestock sector (Table 3).

The share of the livestock population in individual CEE countries covered by coupled payment varies (from 96% in Estonia to 16% in Romania). The size of the livestock sector in the respective countries likely plays a role in the distribution of payments. On the other hand, the share of agricultural land covered by coupled payments is more homogeneous (between 0-10%).

Table 3: Planned output under CIS and share of total LSU/UAA

Category	Target value for 2028	Share of total LSU/UAA (w/ grassland)[19]
Livestock	8.089.697 (LSU)	36,4%
Plants	1.293.561 (ha)	3,4%
Fodder plants	388.624 (ha)	1,0%
Protein plants	661.568 (ha)	1,8%

Source: Own calculations based on CSPs.

Countries cannot support pig and poultry production with coupled payments, regardless of the intensity of production or whether production is free range or in closed systems. They, however, can support intensive dairy and beef production, in particular if there are no environmental safeguards (e.g. no limits beyond mandatory upper limits on LU/ha), if there is no targeting to specific types of animals (e.g. only small ruminants, or livestock in mountain areas), or no capping of total payments per holding. Moreover, coupled fodder and protein plant payments also tend to favour intensive livestock production, since more extensive producers tend to rely primarily on grasslands for fodder.

Livestock coupled payments predominantly support cattle (beef and unspecified) and dairy cows, with over six billion LSU units, which on the whole are more intensively raised compared to small ruminants and suckler cows. Poland dedicates the largest amount of 1.6 billion EUR to cattle farming and exceeds all other countries, making up 32% of the coupled payments given to livestock in CEE. Although coupled payments are also offered for more extensive livestock, in particular small ruminants and suckler cows[20], the budget and payment per LU are significantly higher for cattle and dairy cows (see Table 4).

19 Share of LSU data of 2020 for Livestock production and share of Utilised agricultural area data (2022) excluding permanent grassland, as not applicable to arable farming with production of plants, fodder plants or protein plants.

20 Suckler cow rearing is characterized by the more natural way in which the animals are kept. Calves stay with their mothers after birth and typically have access to pastures.

Table 4: Coupled income support for different animal types in EUR

Country	Cattle & Dairy (€)	Suckler cows (€)	Small ruminants (€)	Total (€)
BG	253.876.222		66.471.047	320.347.269
CZ	119.618.705		13.971.410	133.590.115
EE	61.358.256	28.249.404	5.463.601	95.071.261
HR	160.900.900	24.779.300	16.966.000	202.646.200
HU	361.004.886	170.479.173	107.153.607	638.637.666
LT	321.120.594		15.652.200	336.772.794
LV	175.839.963		4.085.691	179.925.654
PL	1.685.296.437		381.123.025	2.066.419.462
RO	647.386.000		411.840.000	1.059.226.000
SI	48.008.461	30.909.560	6.576.498	85.494.519
SK	141.807.771		28.000.000	169.807.771
Total	**3.976.218.195**	**254.417.437**	**1.057.303.079**	**5.287.938.711**

Source: own calculations based on CSPs.

Coupled payments do not have clear or sufficient environmental or animal welfare criteria attached to them that would ensure that these payments do not support very intensive production, or even intensification of livestock production.

To the contrary, several countries support also very large herds. For example, in Bulgaria 40% of the planned target for coupled payments is for dairy herds with over 150 LSU, in Estonia 57% of targeted LSU is for dairy cows in herds above 270 LSU. In Lithuania the payment for dairy cows is progressively larger (below 10 LSU, 161 EUR, for 10-150 LSU it is 207 EUR, and above 150 LSU it is 230 EUR). Latvian coupled payment for dairy cows also sets a minimum milk annual yield of at least 6.300kg, whereas for organic or Latvian breeds the minimum yield is lower (4.650kg). Most countries do not explicitly set an upper limit on the size of dairy herds for which farmers can receive payments (exceptions are Poland where payment is granted up to a maximum of 20LU (beef and dairy herds) and Romania with the payments up to 250 LSU for dairy herds).

The requirements attached to the receipt of payments include primarily that animals are identified and registered, in some cases there is a requirement for minimum period during which animals need to be kept on the farm. A couple of countries have additional support for animals where farms are included in performance testing. Only Czechia includes an explicit requirement for grazing for a certain period for small ruminants. Croatia sets the requirements that recipients must attend a compulsory training on microbial resistance and nitrate pollution. Slovenia offers a higher payment of 30% for animals included in a quality scheme or organic farming, but the quality scheme requirements are very weak compared to organic farming despite equal payments. Slovenia is the only country that targets dairy payments only to farms in mountain areas, if their sales equal or exceed average milk yield for organic production, and also sets a 30% higher payment for suckler cows for farms in less favoured areas.

In countries with dominant arable sectors, including Romania, Slovakia, Czechia and Hungary or Lithuania, a move towards more mixed systems and re-integration of livestock and arable systems can be argued to be beneficial for soil health and for farm / landscape circularity. However, coupled payment or animal welfare schemes do set any explicit focus on re-integration of livestock in arable systems. In Lithuania, for example, there is a longstanding trend of decreasing grasslands and limited livestock, so that one could argue that increase in herd size is beneficial for a move towards more mixed livestock-arable systems and to support transition from arable to grasslands on peatlands. Nonetheless, the coupled payments set no requirement for grazing or outdoor access so that this payment encourages intensive housed livestock, heavily reliant on brought-in fodder, rather than more extensive grassland-based livestock production.

With respect to coupled payments for plant production, it is important to note that this includes in several cases support for sugar beets, a row crop which is often associated with soil erosion. At the same time, several countries set minimum area requirements for coupled payments, at 1ha or 0,3ha per crop type, which would exclude small / micro producers of vegetables or very small mixed farms with very diverse cropping patterns. Latvia and Slovenia do not provide any support for vegetable production, and Poland only supports tomatoes as vegetables.

4.3.5 Animal welfare payments primarily support minimal improvements in intensive poultry, pigs and dairy sectors

Animal welfare is important for achieving climate objectives. For example, improved health leads to improved longevity of animals, which means that the unproductive phase of the life cycle is reduced if animals live longer. Improved animal welfare and health is also related to the reduced need for the use of antimicrobials (Broom, 2017) and contributes in general to increasing sustainability of intensive livestock production. Ambitious animal welfare measures include access to outdoor and grazing. Ultimately, animal welfare is associated with reduced intensity of livestock production in terms of LSU/ha or in terms of the size of density of indoor livestock housing facilities.

Under the current CAP, countries can fund animal welfare measures under eco-schemes, or as a separate EAFRD intervention (as part of ENVCLIM) or via farm investments. All CEE countries make use of animal welfare interventions in their CSPs. Most countries only support animal welfare under EAFRD.
Latvia and Poland use eco-schemes, and Romania and Slovakia use eco-schemes and ENVCLIM. Poland, Romania and Hungary have separate investment interventions for animal welfare.

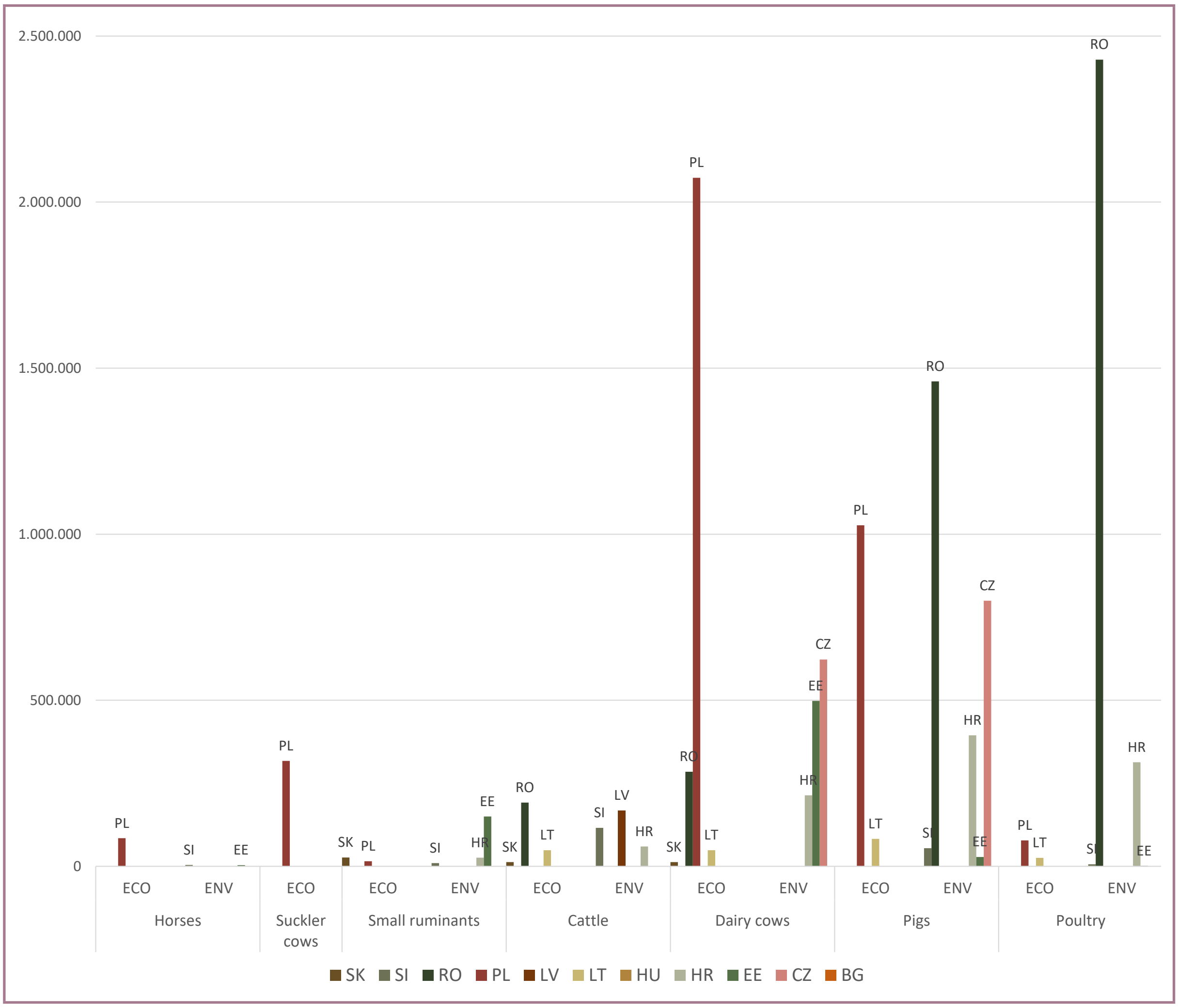
Table 5: Use of different interventions to support animal welfare

Animal welfare measures under:	CEE Countries
Eco-schemes and RD (only ENVCLIM here)	RO, SK
Under eco-schemes only	LT, PL
Under RD only (only ENVCLIM here)	BG, CZ, EE, HR, HU, LV, SI
Separate investment intervention	PL, RO, HU
No intervention type	-

Source: Own compilation based on CSPs and EC 2024c

The majority of animal welfare interventions are focused on poultry and pig production, followed by dairy cows (See Table 5). Romania, Poland, Czechia and Croatia have the highest LSU targets for animal welfare under eco-schemes and ENVCLIM interventions (Figure 13).

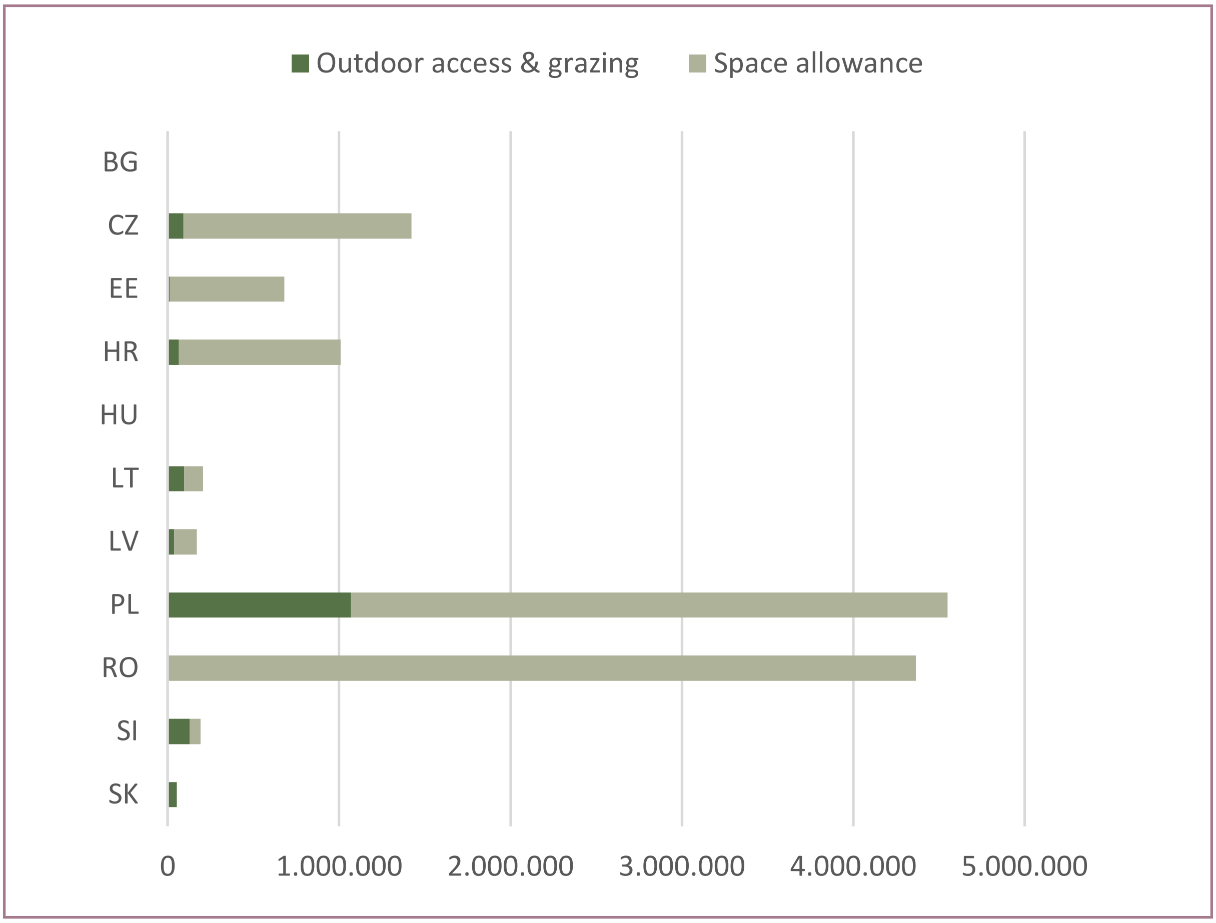
Figure 13: Livestock units supported by animal welfare measures under Eco-schemes (ECO) and ENVCLIM (ENV)



Source: Own calculations based on CSPs
Note: Bulgaria and Hungary do not set LSU outputs at sub-intervention level in their plans, Slovakia does not specify LSU outputs for pigs and poultry under ENVCLIM.

When looking more closely at the intervention design, the requirements for improvements in animal welfare are low, with the dominant focus being on incremental technical improvements (space allowance or living conditions), and only very limited support for more ambitious access to outdoors or to grazing. This can be seen from the target values set for different animal welfare sub-interventions (i.e. how many livestock units (LSU) would be targeted by the specific payments) (Figure 14).

Figure 14: LSU targets set for animal welfare measures related to either outdoor access & grazing or space allowance



Source: Own calculations based on CSPs.
Note: Bulgaria and Hungary do not set LSU outputs at sub-intervention level in their plans, Slovakia does not specify LSU outputs for pigs and poultry under ENVCLIM

The technical interventions focused on space allowance tend to have very low requirements. Most interventions include an increase in living space between 10% and 20%. Only the Polish animal welfare eco-scheme provides support for both 20% and a 50% increase in living space for dairy cows and for pigs. However, even here, the higher ambition has a much lower targeted uptake. For example, for dairy cows, the majority of 355.551 LSU is planned for lower tier, compared to 88.888 LSU for a 50% increase. Of all plans, only the Croatian CSP explicitly supports a reduction in animal density as opposed to just an increase in living space, however, this is also set only at 10% density decrease.

Even where interventions include a more ambitious option, the payment level may be insufficient to incentivize farmers to take up the higher tier option. For example, in the case of the Polish eco-scheme, the payment level increases from 165 EUR for 20% living space increase to 239 EUR for 50% living space increase, which may be insufficient. The initial information on the uptake of the Polish eco-scheme shows that the interest from farmers was low in 2023, and the target for 2023 was not met.

In relation to poultry, the Croatian plan allocates a small payment for the 10% reduction in animal density compared to the payment for increasing living space, which indicates that the intervention would not lead to any reduction in animal numbers. The low level of increase in living space and minimal financial incentives for reducing density are not likely to be sufficient to drive meaningful improvements in poultry welfare.

Several animal welfare interventions support other minimal improvements, such as control for toxins in feed, or feeding plan for dairy cows (Croatia), improving housing conditions for poultry such as addition of perches or better bedding materials, or also improved animal handling. These improvements are important but remain modest. Croatia, for example, incentivizes compliance with a ban on beak trimming, a practice already outlawed, and offers support for operations if they can demonstrate that 90% of pigs have intact tails while also meeting enhanced housing conditions.

Some of the interventions focused on outdoor access are very limited in ambition. In Croatia, for example, one requirement for pig breeding is to allow outdoor access twice a week for at least two hours, with an outlet area of 1,3m^2 per sow.

The interventions focused on grazing, typically require grazing from May through August, or they set the requirement between 140 to at least 160days. In a ´grazing´ intervention Estonia sets additional requirements/ safeguards with conditions that overgrazing is prohibited, by setting requirements for shelter access, and to have an animal welfare assessment protocol. However, it is only a partial-farm measure, where part of the cattle can be grazed and part not. One of Hungarian schemes requires more extended grazing, of at least 160 days, with a grassland management plan, including the history of the fields, start and end of the pasture and animal numbers grazed. In a newer version of their CSP, Romania included a cattle welfare measure, supporting `extensive grazing on grasslands under optimal sustainability conditions`, with requirements for a maximum of 1LSU per ha and grazing for six hours a day for at least 120days.

Investments

Poland allocates over 309 million EUR to a separate investment intervention for improving welfare of cattle and pigs and another 70 million EUR to prevent the spread of African swine fever. Romania and Hungary also include separate animal welfare investments focused on pig production, with a much smaller cumulative amount (10 and eight million EUR respectively). In Romania, efforts concentrate on enhancing microclimate parameters within pig facilities. Alongside supporting an additional 15% increase in living space, they target a 30% reduction in dust and 15% reduction in ammonia concentration compared to mandatory minimum levels. Hungary includes measures aimed at disease control, such as reducing stress and the risk of tail biting.

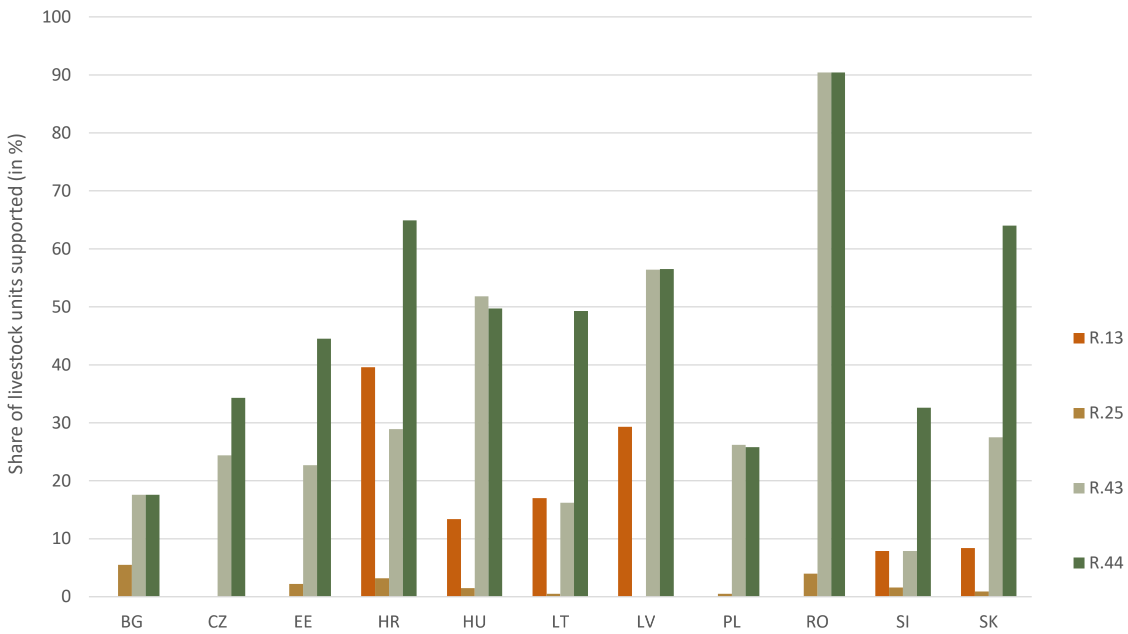
Modernisation investments, which make up the bulk of investment funds, also provide support for modernisation of stables and can set minimum requirements for animal welfare. In Slovenia, for example, the basic requirement for new stables is that they must meet animal welfare standards for organic farming. Further analysis of these requirements and targets relevant for animal welfare, however, is outside of the scope of this work.

4.3.6 Measures focused on reducing GHG emissions address a small share of the livestock population

Six countries programme interventions focused on reducing livestock emissions with technological measures (CR, HU, LV, LT, SK, SI). Under eco-schemes, four countries offer support for low-emission slurry application (LV, PL; SI, HU), and Slovenia also for feed additives and urease/nitrification inhibitors (SI). Under agri-environment-climate schemes, Slovenia includes an intervention on targeted feeding for cattle, pigs, and sheep/ goats. Some countries also include support for feeding regimes under animal welfare intervention, although it is not clear whether these are explicitly focused on emission reductions and feed additives or not (for example, Latvia and Croatia).

Countries can show the level of ambition on reducing emissions from livestock sector under the indicator R.13, which shows the share of livestock units targeted under interventions to reduce GHG and/or ammonia emissions, including via manure management. Here countries also include measures that focus on feed efficiency and feed additives (Figure 15).

Figure 15: Targets set for the livestock relevant result indicators



Source: Own calculations based on EC 2024c, Note: R.13 Reducing emissions in the livestock sector, R.25 Environmental performance in the livestock sector, R.43 Limiting antimicrobial use, R.44 Improving animal welfare

The result indicator R.25 »environmental performance in the livestock sector«, shows the share of livestock units under commitments to improve environmental sustainability. The result indicator has a limited number of interventions with limited budget, and exclusively counts interventions focused on the protection of endangered and local livestock species. The only exception is Romania which also counts an eco-scheme »Increasing cattle welfare through extensive grazing on grasslands under optimal sustainability conditions« under this indicator.

As can be seen in Figure 15, in terms of the scope of ambition, the primary measure for addressing the livestock sector sustainability are animal welfare interventions (R.44). Some countries also count organic farming interventions towards animal welfare indicators. Indeed, some countries, count animal interventions towards multiple of these result indicators. Croatia, for example, counts the same animal welfare intervention towards R.13, R.43, and R.44.

4.3.7 Investments supporting reductions in GHG emissions do not include safeguards to protect against potential risks for soil health

Five countries (CZ, HU, LV, SI, SK) design distinct interventions for investments that contribute to reducing ammonia / GHG emissions. Lithuania supports these investments under intervention 'sustainable investments in agricultural holdings'. Other interventions which are dedicated solely to climate investments focus on renewable energy or energy efficiency (HR, HU, LV, PL, SI). However, it is also possible that other countries support technological investments for the purpose of reducing GHG emissions under the umbrella modernization investments.

The Czech investment intervention Technologies for reducing GHG and ammonia emissions is illustrative in the range of possible technologies supported under investments for emission reductions. It includes support for precision fertiliser application, machinery for direct injection of organic fertiliser into soil, direct sowing machinery, improvements in microclimate of stables, or manure/slurry storage, robotic equipment for manure and slurry removal etc. These technologies contribute to reducing emission intensity of production. It is not possible to assess the actual impacts of these interventions, because the targets for different technology types are not declared. The planned budget distinguishes between investments in plant and livestock production, but not to different types of technologies or GHG reduction targets. Although there is potential that reductions will be delivered, it is not possible to estimate actual contribution of the investments to particular effects to mitigation (e.g. targets in GHG emissions reduction are not available).

When the investments in efficient use of nitrogen fertilisers support individual and collective investments in low-emission machinery, this can lead to adverse impacts on soil health due to the size and weight of this machinery. The weight of machinery can lead to high increase in risk for subsoil compaction (Schjønning et al., n.d.; Thorsøe et al., 2019). However, the interventions do not support any requirements that only machinery should be supported that minimizes this risk (in terms of its total size/weight) or that compulsory training is provided to farmers on how to minimize the risk for soil compaction.

4.3.8 Peatland rewetting as a key mitigation option is hardly supported, and paludiculture is not at all applied

Peatland rewetting is among the most effective nature-based solutions for climate mitigation and adaptation. Undrained peatlands protect existing carbon stores and ecosystem services, and if they are already drained, peatlands can be rewetted and restored to reduce GHG emissions associated with their drainage.

The CSPs offer three main ways to support peatland conservation and rewetting: 1) GAEC2 standard under conditionality which focuses on the protection of wetlands and peatlands, 2) voluntary eco-schemes and agri-environment-climate area-based payments, or 3) voluntary payments for productive or non-productive investments.

Eco-schemes with payments on a yearly basis provide a good basis for support for already rewetted peatlands and existing paludiculture sites. AECC measures can offer financial support over a longer period. A good mix of voluntary measures under EAGF (Eco-schemes) and EAFRD (AECC, investments) can incentivize and reward farmers for the uptake of peatland rewetting and paludiculture while going beyond the minimum GAEC 2 requirements.

Conditionality to protect wetlands and peatlands

GAEC 2 is a new GAEC, introduced to increase the protection of carbon rich soils, particularly in peatlands and wetlands. The actual requirements allow that all agricultural activity can remain possible on wetland and peatland areas, thus leaving the status quo of drainage-based agriculture untouched (MSF, 2021). Nonetheless, if implemented well, GAEC2 can prevent new drainage and thus have a significant impact on avoiding further emissions resulting from peat soils. This is particularly important in countries with large amounts of organic soils, which in CEE includes Estonia, Latvia, Lithuania, Poland, and Romania (Tanneberger et al., 2017).

Not all CEE countries have indicated yet how they will implement GAEC2. In countries with the highest share of peatlands, Estonia and Poland have set no clear requirements for the current period, Latvia bans additional drainage and implements some restrictions on tillage (low tillage) and machinery use, and Lithuania prohibits the conversion of designated wetlands and burning of designated peatlands (EC, 2023). The other CEE countries (BG, HR, CZ, HU, SI and SK) have only marginal parts of UAA as wetlands and peatlands, with BG, SI having restrictions in place while HR, CZ, HU, SK have not specified the rules for the current period.

Most CEE countries have made use of the derogation option, which means that the GAEC 2 would begin to be enforced with delay, either in 2024 (SI, LT, EE) or in 2025 (BG, SK, CZ, HU, PL, HR, LV). Only Romania has set the implementation to start in 2023. The main argument for delaying the application of GAEC2 is that there is a lack of spatial data of peatland distribution and sufficient mechanisms to monitor changes in water levels (EC, 2023; MSF, 2021). To fill this gap existing scientific data needs to be made available for CSP implementation, and further research may also be needed to increase data availability.

Eco-schemes and AECCs

Overall, six CEE Member States have voluntary measures for peatlands programmed under the CAP. Lithuania offers several eco-schemes on the management of wetlands and conversion of arable land on organic soils to grassland. Poland has programmed result-based eco-scheme to support water retention on permanent grasslands, which is however very limited, as it only applies to permanent grasslands covered by agri-environment-climate or under organic farming. Payment is also very low, which does not encourage farmers to implement any actions to improve water level.

Under agri-environment-climate measures, Hungary provides support to farmers of temporarily maintaining a high-water table in arable and grassland areas, and PL, CZ and SK support the management of valuable habitats and species, including in Natura 2000, which occur on wetlands.

Overall, the voluntary measures programmed incentivizing the rewetting and sustainable management of peatlands are likely to have a positive impact. However, their scale and impact remain limited due to limited funding, payment levels and area coverage. In particular, the four countries with the highest share of peatlands - Estonia, Latvia, Lithuania, and Poland – have limited interventions to incentivize the rewetting of previously drained peatlands. Peatland support constitutes only a small fraction of the overall planned output, as illustrated by the ambition and budget graph in Chapter 3.1. Furthermore, the lack of sub-interventions dedicated to peatlands, particularly in Latvia where none are foreseen in its CSP. In Lithuania, for example, the eco-schemes for peatlands are seen to be designed well, but their uptake has been limited. For example, the eco-scheme on conversion of arable land to grasslands on peatlands has a target area of 9.000ha for 2027. The uptake in 2023 has been just under 2.000ha, which is only half of planned output for 2023. Interest in this eco-scheme is limited because it continues to remain economically more advantageous to grow crops than to have grasslands.

The lack of integrating paludiculture in any of the CEE CSPs represents a missed opportunity to leverage this approach for transitioning from drainage-based agriculture to peatland conservation and sustainable land use.

Investments

The primary support in investment measures goes to modernization investments. It was not possible to do a detailed analysis of whether countries introduce any safeguards under modernization payments that would avoid damaging investments targeting peatland areas. However, there are some interventions which focus on drainage that are counterproductive. Lithuania, for example, supports an investment intervention in restoration of drainage systems, which do not have a requirement to support smart drainage systems which also enable raising water levels, but rather just focus on restoring drainage primarily in areas under arable cropping. The interest in this measure in the first year was very high (151% of uptake compared to planned uptake for 2023), with environmental stakeholders objecting to this measure in the first place.

Moving forward

The current ambition on peatlands is very limited and needs to be intensified to deliver sufficient emission reductions, especially in the peatland rich countries. Several steps are possible to step up ambition.

To improve the CSP contribution to peatland protection countries can set stricter restrictions under the GAEC 2 standard, in relation to new drainage or renewal of drainage. For example, Germany has put restrictions on peatlands such as ploughing and grazing. However, new drainage is still permitted with authorisation, and repairs to existing drainage are permitted without authorization (EC, 2023).

At the same time, the CSPs will also need to ensure that peatland rewetting and more broadly a shift from drainage-based agriculture to paludiculture is not hindered by other requirements, such as the criteria for what type of agricultural activities and paludiculture crops are eligible for direct payments under EAGF. First, countries can expand the definition of grasslands to include shrubs and trees to make wet grasslands and less productive areas eligible for direct payments and by extension also ensure these are eligible for eco-scheme payments. Secondly, the EU Commission should expand the range of paludiculture crops that are eligible for direct payments such as cattail or reed in the CSP regulation including clear and simple requirements for the eligibility of areas under CSPs. Currently only a few paludiculture crops such as peat mosses have been accepted as agricultural activities under Article 1a) "agricultural activity".

Countries can introduce more ambitious agri-environment-climate measures, with larger share of funding and area coverage, and explicitly combine measures to better support peatland rewetting in combination with paludiculture. Inspiration can, for example, be taken from:

- Germany's agri-environment-climate scheme which combines support for the rewetting of peatland in agricultural use with options that support grazing with suitable livestock breeds or paludiculture crops and can be combined with an eco-scheme payment (Scheid & Ittner, 2023).
- The Dutch Eco-scheme to cultivate a "wet crop" as the main crop on land designated as agricultural area between 2015 and 2022 and to harvest the crop at least once a year (including crops such as azolla, cranberry, cattail, reed, and wild rice) (EC, 2023).
- Denmark allocates the largest financial resources for on-farm non-productive investments on the creation of wetlands and other water and climate projects (EC, 2023).

Since paludiculture is a new concept and not yet widely known or accepted in CEE countries, pilot projects can be funded within this programming period via EIP or LIFE project funds, or also via other funding instruments available for climate and environment in different countries. Lithuania, for example, is using post-Covid recovery funds to finance peatland projects, but it is not clear whether paludiculture pilots are included. The funds dedicated to peatland projects have so far been used more to finance biodiversity protection[21]. However, they have also started to be used to fund paludiculture pilots to test and illustrate the potential, practical feasibility, and a business case for paludiculture[22].

4.3.9 Agroforestry is hardly supported despite its significant mitigation and adaptation potential

The CSPs can support both traditional agroforestry systems, such as orchard meadows, or the establishment of new agroforestry systems, either silvopastoral or silvoarable. Silvoarable systems are less known and developed. They can be very important, however, in landscapes dominated by large field sizes and absence of landscape features, such as trees or hedges, or even flower or grassland strips.

The establishment of new agroforestry systems is constrained by various factors, including the long-term nature of the change, that often does not match with the short-term rental agreements many farmers have, significant shift in the farming systems with legal and economic implications and uncertainty for farmers, investment cost for machinery, as well as the fact that agroforestry is a new farming approach requiring specific knowledge and advisory support. Therefore, to support new agroforestry systems a combination of measures is necessary to address the different barriers, including support for establishment, maintenance, and knowledge/advisory support. Research, knowledge transfer and advisory services are important because agroforestry system involves a complex understanding of biotic and abiotic environmental factors within the landscapes.

21 For example, in Poland, past projects included "Strengthening the southeastern metapopulation of Aquatic Warbler Acrocephalus paludicola in Poland ": https://otop.org.pl/naszeprojekty/chronimy/wodniczka/wzmocnienie-poludniowo-wschodniej-metapopulacji-wodniczki-acrocephalus-paludicola-polsce/

22 An example of an ongoing project is the MultiPeat project

Eligibility requirements for CAP payments hinder the development of agroforestry

Countries have the flexibility to include 'other species such as trees and/or shrubs" in their definition of permanent grasslands. This has important implications for agroforestry as it can mean that traditional systems for silvopasture can be eligible for CAP payments. Bulgaria and Romania allow trees on permanent grassland all over their territory if herbaceous vegetation "remains predominant". Other countries, however, exclude trees in the definition of permanent grasslands, so that more extensive systems or grassland beginning to be overgrown is not eligible. This means that farmers who have such land are not eligible for basic EAGF payments (BISS payments) (Bertomeu & Lawson, 2023).

In Slovakia, 'white spots' refers to areas which are not eligible for payments. In relation to agroforestry this includes abandoned land, which is no longer actively farmed, which already has some trees on it. These areas can still be of high biodiversity value. If trees are not allowed, this incentivizes their removal or, on the other hand, reduces the incentive for farmers to continue to use the land for agricultural purposes, thus leading to further abandonment of this land.

Conditionality

GAEC8 is the most relevant element of conditionality for agroforestry, as it is focused on non-productive features, which can include four elements relevant of agroforestry: hedges or woody strips, tree lines, tree groups or isolated trees.

In terms of the GAEC8 design, BG, CR, RO, SK, SI include all four elements, whereas CZ, LV and PL do not include hedges or woody strips, EE and PL do not include isolated trees, and HU and LT do not include trees in line (Lawson & De Boeck, 2023).

As mentioned above, the exemptions and derogations currently limit the potential of GAEC8 to support non-productive features, and the lack of inclusion of isolated trees or trees in line in several countries further limits the impact once it is implemented.

Eco-schemes

None of the CEE countries target agroforestry systems through their eco-schemes. In the EU, only Greece and Germany offer such eco-schemes. Lithuania includes an eco-scheme on landscape elements, however, this eco-scheme does not allow productive use of the land around these landscape elements, such as pasture.

AECCs and investments

Agroforestry is supported through AECCs and investments. Five CSPs support agroforestry systems through AECCs (SI, HU, CZ, SK, PL). Seven CSPs also support investments which can support either afforestation and/or agroforestry systems (PL, CZ, SK, BG, HU, LT, LV). A full differentiation was not possible, so it may be that only a subset of these countries has investment support for agroforestry.

Some countries support traditional meadow orchards (PL, CR, SI), although with very small total area dedicated to these (492ha, 1.100ha, 93ha respectively). Croatia also supports extensive olive orchards (674ha). In total, the area compared to the total UAA in these countries is hardly significant. Four countries support the establishment of new agroforestry systems (PL, CZ, SK, HU). These countries have both area payments differentiated for the establishment and maintenance, as well as separate investment interventions dedicated to the establishment of agroforestry systems. The total budget dedicated to agroforestry investment interventions among PL, CZ, SK is only 5,2 million EUR. Hungary supports the establishment of tree lines and agroforestry in arable land, woody pastures as part of a broader intervention to support non-productive agroecological investments, with a total of 13 million EUR, so that it is not clear what share will be dedicated to agroforestry elements.

While the inclusion of support for the establishment and maintenance can be seen as positive, often the planned output and financial support per hectare is low and unambitious. For example, the CZ agroforestry AECC is designed well and has a nearly double payment level compared to Slovak agroforestry. The implementation of the CZ scheme is seen to have been smooth, with early collaboration with stakeholders in design stage, clear communication of scheme requirements, and advisory support. Agroforestry is clearly recognized in the CSP SWOT analysis as playing an important role for mitigation, adaptation, and other environmental targets, and agroforestry is also recognized in the national adaptation plan. However, the target area is only set at 180ha per year, a negligible area given the size of the Czech UAA. The Slovak target area is larger, but the payment level much lower despite similar costs for establishment. The Slovak scheme also does not allow for the management of trees, and there has been no dedicated advisory support to increase farmers' interest and support them in the implementation of the measures. These examples show that there is room to both increase ambition, in terms of payment levels and area coverage, as well as in terms of the design and implementation of schemes.

An important step in the right direction would be to include greater participation of CEE partners in the European Agroforestry Association (EURAF), as well as in diverse research projects targeting agroforestry systems. For example, in a recently funded Horizon Europe project called DIGITAF, 17 countries are represented with only one country from CEE among these (Czechia).[23] Additionally, greater exchange of knowledge and experience between countries would be needed to increase the interest and internal capacity within the CEE regions for the development of agroforestry systems and their support in different policy areas. For example, two countries, Czechia and Slovakia are examples of good practices with their inclusion of agroforestry also in their national adaptation plans (Lawson et al., 2023).

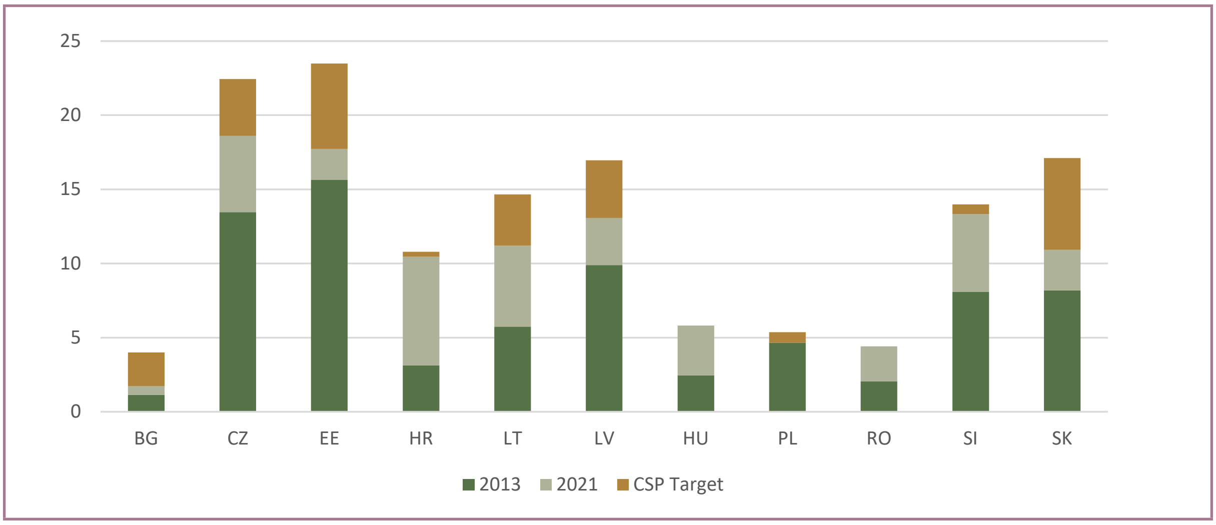
4.3.10 Organic farming receives increased attention, but the support is focused predominantly on the supply side with unclear/limited ambition in relation to processing or market development

The EU's Farm to Fork and Biodiversity Strategy set out the strategic target for 25% of agricultural land to be farmed organically by 2030, an ambitious increase compared to 10% of UAA in 2021. With this target in place, the support for organic farming in CSPs has increased compared to the previous period.

The target area for organic farming by 2027 in CEE countries ranges from less than 5% to nearly 25%, with the countries with the largest share of agricultural area (HU, PL, RO) having set relatively low targets set at country level, although due to their size, the total area might be higher than in other countries (Figure 16).

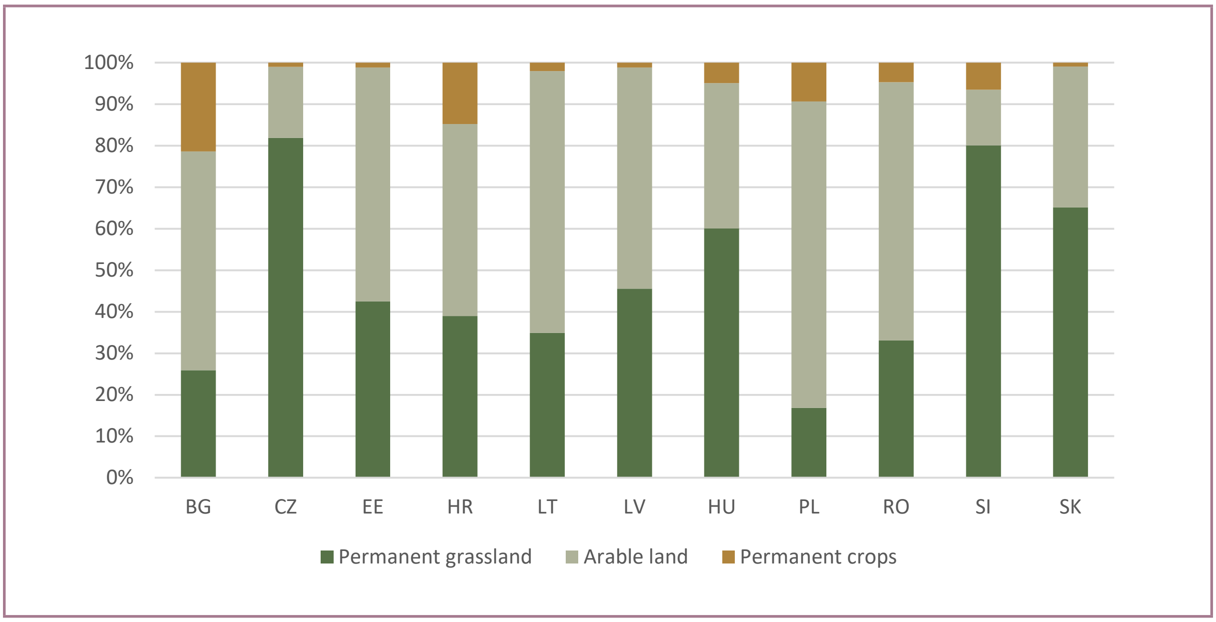
23 https://digitaf.eu/digitaf-partners-consortium/

Figure 16: Status and targets set for UAA under organic farming (% of UAA)



Source: own compilation based on Eurostat, 2024 and EC, 2024c.

Figure 17: Organic crop area by type of land use (2020)



Source: Own compilation based on Eurostat, 2024.

If we look at the trends in the area under organic farming (Figure 17), we can see that the total area in organic farming in the CEE countries increased by 41.7%, or by 963,095 hectares between 2012 and 2021 (EUROSTAT, 2023c). The share of organic farming in total UAA increased from 4.5% to 6.4%, which is lower than the EU share of nearly 10%. All countries, except Poland, witnessed an increase in organic farming, with biggest increases in Croatia, Hungary, Bulgaria and Romania. Nevertheless, in some countries, area under organic farming is fluctuating, indicating that for farmers, becoming or remaining certified is straightforward. While Poland experienced a drop in organic farming after 2015, Bulgaria and Hungary experienced it recently, since 2020.

In their CSPs, countries can support organic farming by offering conversion and maintenance payments, as well as support investments, training and advice for farmers and producer organisations. All CEE countries provide conversion and maintenance payment for organic farming. Organic can also be supported by setting a higher level of co-financing under investment and other schemes. In some cases, farmers receive higher ranking if they are organic or in process of conversion (e.g. LT). In Slovenian CSP, for example, the co-financing rate is set higher for organic farmers under young farmers' scheme or under certain types of investments.

Most CEE countries do not use separate investment sub-interventions with a dedicated fund for organic farming, which makes it difficult to assess to what degree the current CAP funding will go to support the development of processing and marketing activities for organic farming. This is an important point because market development is a key prerequisite for reaching organic farming targets.

Looking at two countries with a high share of organically managed land, Estonia and Slovenia, similar barriers are present, which indicate that additional efforts are needed in the CSPs and organic policy development more broadly to reach the targets[24]. An important barrier to further development of organic farming are insufficient efforts directed towards the development of organic market. In Estonia and Slovenia, available market data shows that the majority of organic food is imported. Some countries, such as Hungary and Romania, have seen a significant growth in the organic area but remain highly export oriented, with organic foods representing a very small share of the national market (IFOAM Organics Europe, 2023).

The lower purchasing power in CEE countries and limited awareness of the difference between local and organic food, with the two being used interchangeably, are important considerations in market development. In Slovenia, the majority of organically produced beef, for example, is not marketed as organic beef because of missing elements in the supply chain (e.g. access to slaughterhouses, limited capacity of producers' organisation to organize organic label). Although Slovenia' Organic Farming Action Plan has set a 15% target for the share of organic foods in public canteens, this targets are not met or are partially met only because of imports of organic food. Organic food is often argued to be too expensive for consumers, although there has been very limited activity to support supply chains for organic farming.

It is also important to remove restrictions that may limit the development of organic production, in particular plant production. For example, support for organic plant production may be limited by minimum size requirements for payment eligibility, either for the receipt of basic payments or more likely by the minimum requirements set for receipt of other payments, such as investments support. This can disadvantage especially small horticultural producers.

To support the reaching of ambitious targets, more ambitious and holistic policies are needed, which effectively combine support for production and market development, along with research, knowledge and advice support. For example, in CEE countries there is a lack of specialized competence centers or research networks for organic farming, limited availability of advisory support, and limited capacity of producers' organisations to push forward organic farming policy (Lampkin et al., 2024; Nagy et al., 2023). There are efforts in this direction, however, they are still limited in scope. A notable exception is, for example, Ömki - the Hungarian Research Institute of Organic Agriculture. Further institutional capacity building to enable more holistic organic farming policies is needed.

24 https://agricultura.gencat.cat/web/.content/04-alimentacio/projectes-europeus/enllacos-documents/fitxers-binaris/3a-reunio/Organic-Farming-in-Estonia.pdf

4.4 Quantified estimation of the mitigation potential of selected interventions

To gain additional insights on the climate ambition in the CSPs in CEE countries, we carried out a simplified calculation of the positive mitigation effects of selected interventions, i.e. to what extent the selected interventions contribute to reduced emissions and/or increased carbon stocks as a result of farmers implementing specific practices.

Box 4:

Methodology to estimate the mitigation potential of selected interventions

For each CEE country data on farming practices and investment interventions supported in the CAP Strategic Plans (CSPs) was extracted into a spreadsheet which had previously been developed for the following study: "An evaluation study of the impact of the CAP on climate change and greenhouse gas emissions". The farming practices that are defined in the CSP plans were mapped onto a pre-existing list of farm mitigation measures, for which mitigation potential has already been estimated using data in published literature. The list of the mitigation measures to which farming practices were mapped is given in Annex 2.

The uptake values defined for farming practices in the CSPs were reviewed and compared against agricultural activity data for each country, and where necessary, revised using expert judgement. Uptake values were expressed as values in hectares, livestock populations, or number of businesses. The minimum and maximum uptake values were used based on planned output between 2024 and 2028. The uptake values were then used with previously determined mitigation potential values (maximum and minimum values) for the different mitigation measures to calculate the mitigation potential (maximum and minimum) for each relevant mitigation action in each country. Mid-range values were calculated as the mid-point (mean) of the minimum and maximum values. The greenhouse gas (GHG) mitigation potential presented is calculated using the estimated mitigation potential per hectare or per head of livestock for the different measures multiplied by the estimated uptake of each farm mitigation action[25].

The results indicate the potential scale of impact from a set of measures programmed in the CSPs. Specifically, the method captured the following interventions: area-based payments under eco-schemes and agri-environment-climate measures, animal welfare payments where there was a clear link to improved animal health and thus mitigation effect, measures on feeding improvements, as well as investment measures which targeted mitigation actions at intervention level, i.e. those investments that explicitly targeted climate, environment, and energy objectives at intervention level. It was not possible to calculate impact on emissions, carbon sequestration or the losses of carbon stocks from other interventions, including, for example, coupled payments, conditionality, or more general investments interventions in modernization or productivity. In the assessment we could not consider how programmed interventions potentially reduce carbon stocks or increase emissions, for example, if grassland is ploughed or coupled payments incentivize increased intensity or numbers of livestock. We also could not calculate impacts of investment measures, which were not explicitly targeted at climate objectives at intervention level. This is because data on uptake for different types of interventions were not available. These limitations must be considered when looking at the results.

The mitigation potential resulting from the programmed farming practices is presented either as absolute savings in emissions in terms of CO_2 equivalents or as percentages of emissions from agriculture and agricultural land. The comparison baseline is the most recent data from national inventories (2021) by country. The mitigation potential is made of reduced net emissions of greenhouse gases (N_2O, CH_4, and CO_2 emissions) and additional carbon sequestration.

25 The mitigation co-efficients for the measures are net impact co-efficients, i.e. they consider total sum of the impact on carbon stocks and emissions. For example, when a particular practice is introduced (e.g. use of cover crops) there will be various changes which could include increased organic matter incorporated into the soil, and increased loss of carbon from the soil, but the net effect is increased carbon stock.

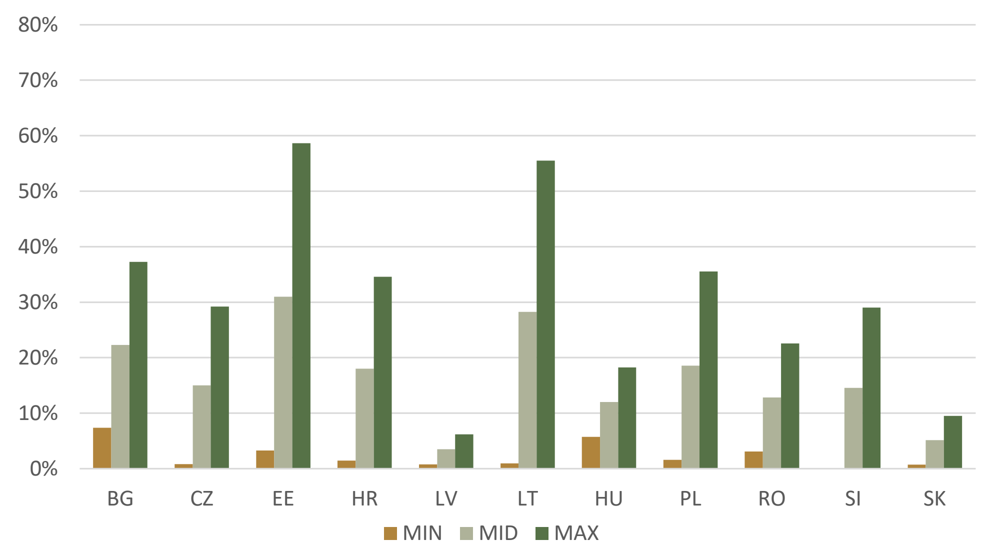
4.4.1 Country-based mitigation potential

The potential climate mitigation – in terms of the share of current emissions that can be mitigated with the interventions considered in the analysis - is expressed as minimum, mid and maximum values. The differences in these values arise from two things: 1) variability in the estimated effectiveness of individual mitigation measures (e.g. because of how they are implemented, or soil type differences, or livestock management differences); and 2) variability in the level of uptake by land managers. The latter has many drivers, including the level of incentivisation, and the practicalities associated with local farming practices. The variation in the level of uptake from 2024 – 2028 is limited and the ranges are primarily, although not exclusively, driven by the variability in the estimated effectiveness of individual measures. In most situations the maximum values are overestimating the potential impact, and the mid-values likely show the more realistic potential on average from the programmed measures.

The purpose of presenting mitigation potential as percentages is to illustrate in a simple way the effect of the programmed measures compared to the total emissions in the agriculture and LULUCF sector.

We can see that there are significant differences among countries, as well as the minimum, medium and maximum estimated potentials (see Figure 18). The overall values for potential mitigation range across the countries from low levels (less than one percent for Latvia, Romania, Slovenia, and Slovakia for minimum mitigation estimates) to greater than 40% (Estonia, Latvia and Poland for maximum mitigation estimates) (see Figure 18), although the average mid-mitigation across countries was 17%.

Figure 18: Share of current emissions from agriculture and LULUCF that can be mitigated with selected CAP interventions in CEE countries, via both reduced GHG emissions and additional C sequestration

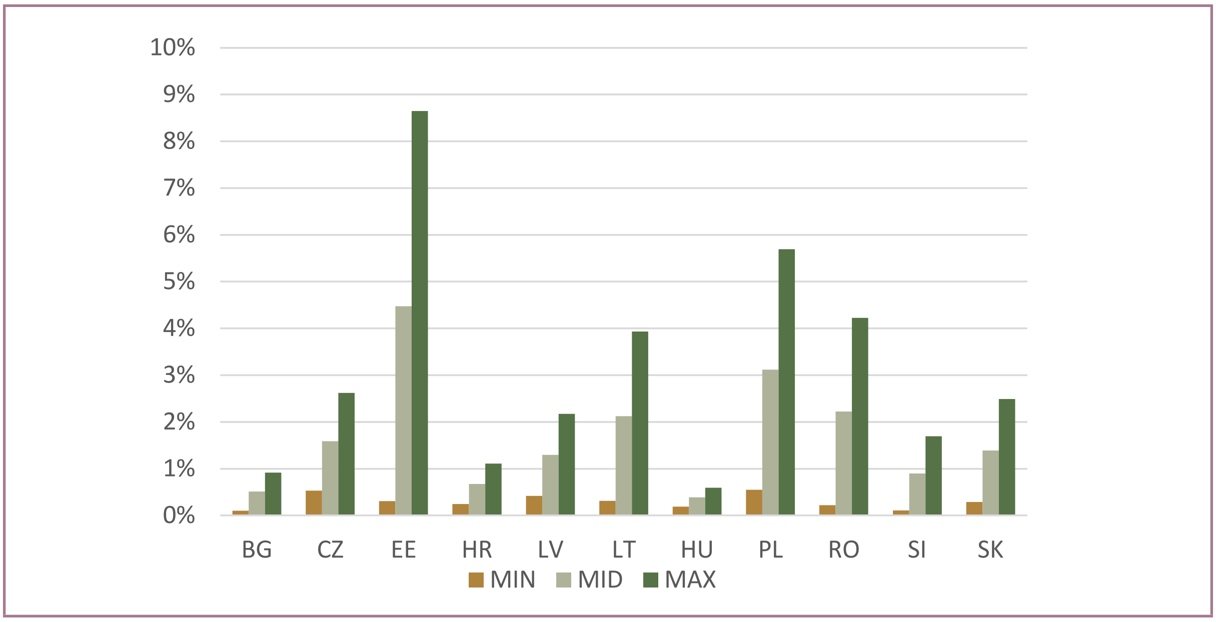


Source: Own calculations based on the analysis of CSPs and data from EEA, 2021. Note: The share is calculated as the sum of potential reductions divided by the sum of emissions from agriculture and LULUCF in 2021[26] . Data bars represent minimum, median and maximum mitigation values based on variation in both mitigation effectiveness and uptake.

26 To calculate the sum of current emissions from agriculture and LULUCF we included only those sub-categories in the inventory which showed net emissions. This simplifies the interpretation, comparing the calculated mitigation potential against the total emissions from agriculture, forestry, and other land use (AFOLU) emissions. This avoids confusion with carbon removals (i.e. sequestration or `negative` emission values in the language of the GHG inventories). The emission categories included in the total emissions used to calculate mitigation percentages vary by country, but in general include all agriculture categories (mainly emissions of CH_4 and N_2O) and within the LULUCF categories always exclude harvested wood products, often exclude forest land and grassland, and sometimes exclude cropland and wetland.

If we look solely at the mitigation potential from measures that focus on reducing emissions, and are thus non-reversible but rather absolute emissions, the mitigation potential is very limited for most countries. Indeed, a key message from this analysis is that mitigation impact from reducing emissions makes up less than 10% of the total mitigation impact across all the countries, whereas carbon sequestration contributes more than 90% of the positive mitigation impact of the interventions considered in this analysis (see Figure 18).

Figure 19: Share of current emissions from agriculture and LULUCF that can be mitigated with selected CAP interventions in CEE countries, via reduced GHG emissions (i.e. excluding additional C sequestration)



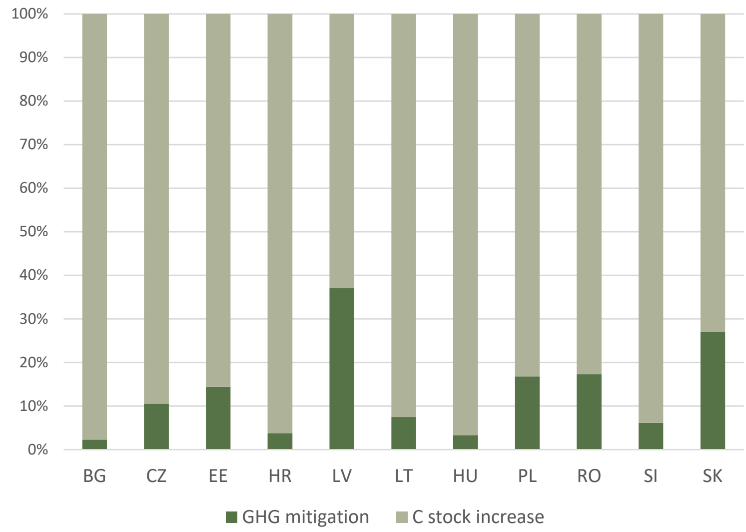
Source: Own calculations based on analysis of CSPs and data from EEA, 2021.
Note: The share is calculated as the sum of potential reductions divided by the sum of emissions from agriculture and LULUCF in 2021. See footnote below Figure 18 for further explanation. Data bars represent minimum, median and maximum mitigation values based on variation in both mitigation effectiveness and uptake.

Countries vary with respect to the relative contributions of carbon sequestration and GHG emission reductions towards the total mitigation potential resulting from selected CSP interventions (Figure 20). For example, Bulgaria had particularly low mitigation of GHG emissions relative to carbon stock changes. This reflects the types of mitigation measures taken up by Bulgaria, overall having the largest climate mitigation effect from carbon stock change. Latvia has a more balanced contribution from carbon stock changes and emission reductions.

Generally, the potential mitigation effect from carbon sequestration is significantly larger than from reducing emissions of gases such as nitrous oxide and methane. These emissions result from microbial processes in soil and in livestock and their manures, and these processes are closely linked to production levels, so that it is difficult to make large savings in these emissions while maintaining current levels of production. Although mitigation of climate impact is greater from increasing carbon stock, this mitigation may not be permanent because the increased carbon stored in soil and biomass can be lost if the management is not continuously maintained. I.e. changes in carbon stocks via carbon sequestration, especially in soils, are easily reversible and non-permanent. On the other hand, although it is difficult to make large savings in emissions of nitrous oxide and methane, any savings made are absolute savings.

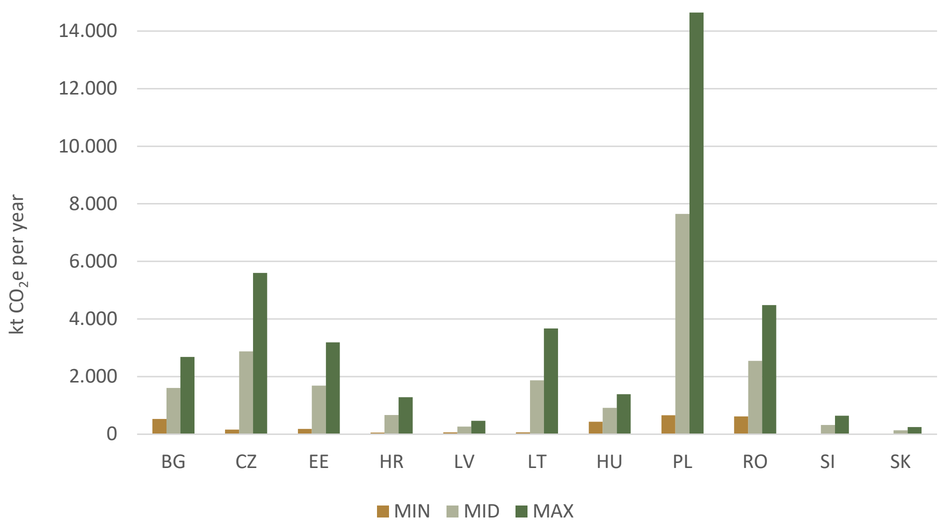
In terms of the absolute size of reductions in GHG emissions (kt CO_2eq per year) resulting from both carbon stock increases and reductions of emissions, Poland emerges as having the largest reductions (Figure 21). Its contribution surpasses that of Romania, which is the country most comparable in size. This reflects that Poland shows higher ambition on climate via eco-schemes compared to Romania. However, compared to other countries such as Czechia and Lithuania (the countries with the next largest kt CO_2e per year mitigated), Poland's UAA is considerably larger. Therefore, the percentage mitigation is best used for comparisons.

Figure 20: Relative contribution of selected CAP interventions in CEE countries towards either carbon sequestration (C stock increase) or reduction of GHG emissions, shown as percentage of the total potential mitigation effect in each country



Source: Own calculations based on analysis of CSPs and data from EEA, 2021.

Figure 21: Total mitigation potential (kt CO_2eq per year) of selected CAP interventions in CEE countries via both reductions in GHG emissions and carbon sequestration



Source: Own calculations based on analysis of CSPs and data from EEA, 2021. Note: data bars represent minimum, median and maximum mitigation values based on variation in both mitigation effectiveness and uptake.

4.4.2 Contribution of individual mitigation measures

Land-based GHG mitigation measures vary in their potential to save emissions or increase carbon stocks and vary in their attractiveness to farmers. These differences lead to differing contributions towards the total mitigation within a country, or for the countries as a group. Figure 22 shows the contribution to overall mitigation of selected measures that lead to net increases in carbon stocks; these are mainly mitigation measures related to land use. Figure 23 shows the contribution to overall mitigation of selected measures that lead to decreased GHG emissions; these are mainly mitigation measures that influence emissions of N_2O and CH_4.

Ranking the mitigation measures in order of t CO_2e saved across the 11 countries, the top ten carbon stock measures were:

1. **MM14c:** Catch/cover crops – 9.302 kt CO_2eq
2. **MM11a:** Retention of crop residues on fields – 3.610 kt CO_2eq
3. **MM5:** Woodland and forestry management – 1.409 kt CO_2eq
4. **MM6:** Hedgerows and woody field margins – 1.024 kt CO_2eq
5. **MM14a:** Rotations with perennial forage crops – 825 kt CO_2eq
6. **MM7:** Peatland/wetland maintenance and conservation – 566 kt CO_2eq
7. **MM4:** Afforestation / avoiding deforestation – 534 kt CO_2eq
8. **MM1:** Conversion of arable land to grassland to sequester carbon in the soil – 512 kt CO_2eq
9. **MM2:** Grassland management to enhance C sequestration – 121 kt CO_2eq
10. **MM3:** New agroforestry – 99 kt CO_2eq

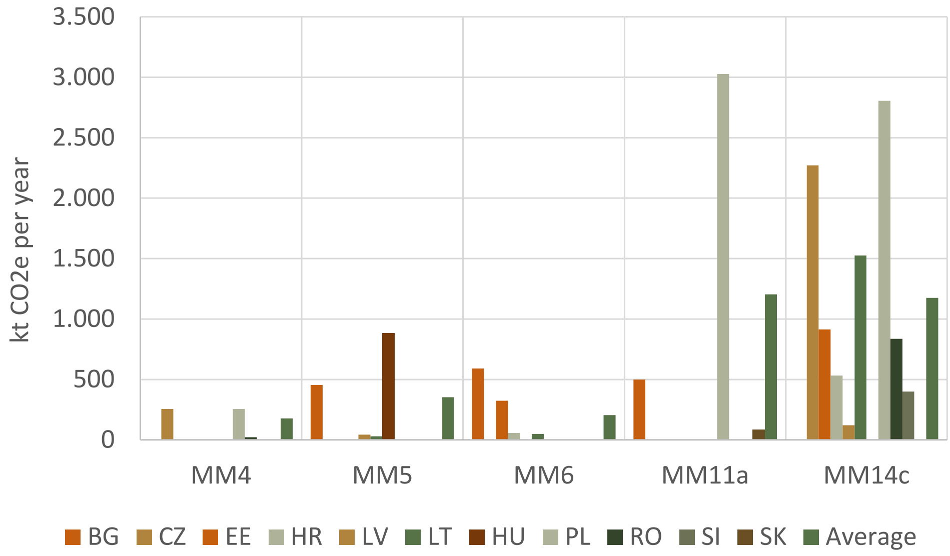
The top ten GHG emission reduction measures were:

1. **MM21b:** Reduction in endemic disease – 1.368 kt CO_2eq
2. **MM14d:** Legumes in a crop rotation and increased legume share in grass mixes – 543 kt CO_2eq
3. **MM16f:** Testing, planning and advice to avoid excess application of N fertiliser – 383 kt CO_2eq
4. **MM16g:** Precision farming with fertiliser placement (variable rate distribution) – 242 kt CO_2eq
5. **MM16d:** Organic production approaches - no synthetic N – 77 kt CO_2eq
6. **MM22b:** Optimised feed strategies – 19 kt CO_2eq
7. **MM10:** Minimum tillage – 11 kt CO_2eq
8. **MM16b:** Urease inhibitors coupled to mineral N fertilisers – 11 kt CO_2eq
9. **MM21a:** Herd fertility – 3,3 kt CO2eq
10. **MM17a:** Slurry application by trailing shoe – 0,40 kt CO_2eq

Of the top ten mitigation measures, catch/cover crops (MM14c in Figure 20) produced the largest climate mitigation effect through carbon stock change for seven of the eleven countries, and the second largest saving for an eighth country (PL) (Figure 20). Retention of crop residues on fields (MM11a in Figure 20) ranked second largest for climate mitigation effect through carbon stock change, but this mitigation measure was utilised by only three countries (Bulgaria, Poland, and Slovakia). These measures are funded by eco-schemes and show the overall impact of implementing measures over large scale, and they also illustrate missed opportunities to enhance climate impact mitigation by introducing additional measures over large area of agricultural land.

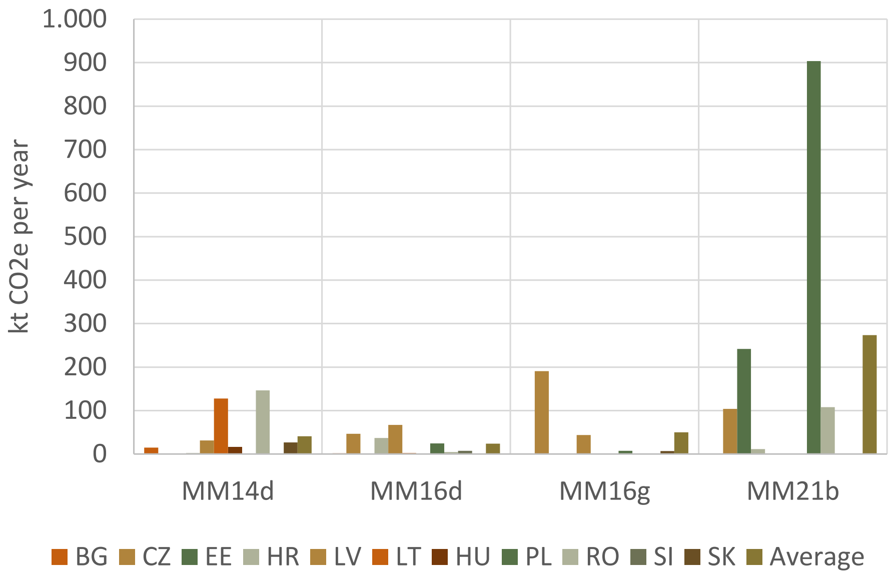
Peatland/wetland maintenance and conservation and new agroforestry are also included in the top ten measures, despite having very little area dedicated to it overall.

Figure 22: Estimates of mitigation potential (kt CO_2eq) for selected farming and land management practices which lead to carbon sequestration



Source: Own calculations based on analysis of CSPs and data from EEA, 2021.

Figure 23: Estimates (kt CO_2eq) of decrease in GHG emissions for selected farming practices



Source: Own calculations based on analysis of CSPs and data from EEA, 2021.

4.5 Conclusions

The CAP has the potential to facilitate the transition towards more climate friendly and resilient agri-food systems in CEE countries. Our analysis of the way the 11 CEE countries have designed the CAP, however, shows that it continues to have limited positive impact for climate mitigation and adaptation and could be much better used to support the transition.

There is an gap between the **budget allocated** towards climate mitigation and adaptation and the untargeted payments towards emission-intensive activities, including livestock production and drainage-based agriculture. The majority of the CSP budget is allocated to the EAGF payments, which have weak conditionality requirements (decoupled, coupled payments) or include voluntary one-year commitments (eco-schemes). Targeted environmental and climate payments under EAFRD make up a minor share of the total CAP budget. Moreover, both coupled payments under EAGF and investment support under EAFRD, which together add up to 22% of the total CSP budget (or 18,6 billion EUR), potentially contribute to further intensification of production in the livestock sector and can thus have perverse effects in terms of climate goals.

The CAP includes some good **mandatory standards** (enhanced conditionality), however, **weak, and insufficient implementation** at country level hinder the large-scale adoption of climate friendly agroecological solutions on croplands and grasslands. The minimum standard on soil management (GAEC 5, 6 & 7) do not sufficiently support soil carbon maintenance and sequestration on mineral soils in arable systems. Minimum standards on non-productive landscape features (GAEC 8) are crucial to support on-farm biodiversity. The continuing exemptions and derogations limit the potential of this standard with no clear development pathway. Requirements for the protection of permanent grassland (GAEC 1 & 9) do not effectively prevent the ploughing of permanent grassland.

The funding and design of eco-schemes and agri-environmental-climate payments are insufficient to incentivize large scale adoption of sustainable farm practices beyond conditionality. Eco-schemes are an important feature in the CAP due to their application over a large area of agricultural land and their significant budget allocation of around 15% of the total CAP budget. Currently, eco-schemes in CEE countries largely focus on cropland management with limited incentives moving beyond currently baselines creating mostly windfall effects. Due to its multi-annual payments, ENVCLIM measures can support the wider transition towards sustainable and resilient business models, while leaving the space for trial-and-error with a clear improvement pathway. However, budget, area targets and intervention design are crucial maintain the status quo and incentivize the transition. CEE countries mainly use ENVCLIM interventions to support the adoption or the maintenance of organic farming, animal welfare, and different types of grassland management while measures focused on arable land are limited.

Coupled payments account for a large share of the CAP budget, primarily supporting the livestock sector without clear environmental and animal welfare requirements. This is an ongoing subsidy for GHG-intensive livestock production, undermining the objective towards increasingly plant-based diets within planetary boundaries. At the same time, coupled payments dedicated to fodder and protein plants also mostly and directly support the emission-intensive livestock sector. Coupled payments largely fail to support marginalized sectors or beneficiaries such as sheperds or small ruminants.

Animal welfare payments support very minimal improvements, primarily in intensive-livestock systems (poultry, pigs and dairy) and are a missed opportunity for targeted payments towards an animal welfare oriented production. The requirements for improvements of animal welfare are low, with the dominant focus being on technical improvements such as space allowance and living conditions, and only very limited support for more ambitious access to outdoors or to grazing.

Modernisation and productivity investments make up a major part of investment funds, have the opportunity to provide incremental financial support for the modernisation of stables including minimum requirements for animal welfare.

Peatland rewetting and agroforestry are key nature-based solutions for climate mitigation, adaptation and other environmental benefits, yet they hardly play a role in the current CSPs in CEE countries. Paludiculture is not supported at all.

Organic farming receives increased attention also via the CAP, with large differences between CEE Member States. The focus is set on developing the production side, while the processing and the market development are lagging. Therefore, the increase in organic farming needs targeted investment and development interventions for the processing and market development of organic produced products. The development of institutional capacity building, research and development and farm advisory support in CEE Member States are crucial to reach the ambitious EU target on organic farming.

The CSPs provide very limited support for emission reductions from the livestock sector, with limited interventions and ambition programmed for the R. 13 indicator on Reducing emissions in the livestock sector. Instead, many countries adress the sustainability aspects in the livestock sector through animal welfare interventions (R.44), with no clear focus on emission reductions and climate protection, and weak overall requirements for animal welfare.

As part of the analysis, we carried out a simplified assessment of the potential mitigation impacts of selected interventions in the CSPs of CEE countries. This assessment considered the area-based payments (eco-schemes, AECCs), animal welfare payments with clear link to animal health, investments with explicit targets relevant for climate. It did not consider impacts from other interventions, such as coupled payments, conditionality or investment interventions on modernisation and productivity. Taking into account the variability in effectiveness and potential uptake of programmed measures, the assessment delivered three potential values – minimum, mid-, and maximum. The maximum values are most likely overestimating the potential impacts, and the mid-values likely demonstrate more realistic impacts.

The assessment confirms that the **CSPs for CEE countries deliver limited mitigation impacts, and these come primarily from carbon sequestration.** The estimates for the potential mitigation impacts range from very low levels ((less than one percent for Latvia, Romania, Slovenia, and Slovakia for minimum mitigation estimates) to greater than 40% reduction of agricultural emissions (Estonia, Latvia and Poland for maximum mitigation estimates), with the most realistic potential values around 17% across the countries. Importantly, the mitigation potential from reducing emissions, i.e. absolute and non-reversible mitigation impact, makes up less than 10% of the total estimated mitigation impact across all the countries. Carbon sequestration, which is reversible and non-permanent, contributes more than 90% of the positive mitigation impact of the interventions considered in this analysis. This further underscores the need for a step change in ambition on reducing emissions.

In the current period, CEE countries can still significantly improve the climate impacts of their CSPs.
The countries can:

- Introduce **environmental and climate ring-fencing for cross-cutting measures** such as investment interventions. The introduction of **degressivity and capping instruments** especially in countries with oversize farm holdings would lead to a fairer distribution of income support towards small- and midsize holdings.
- Strengthen the **conditionalities** around soil health, permanent grassland protection, landscape features and peatland protection.
- Tie **coupled** payments for livestock to clear environmental and animal welfare standards and limit these payments to livestock raised extensively for purpose of supporting biodiversity, prevention of rural abandonment or other clearly defined environmental goals. Phase out coupled payments that currently go to intensively managed livestock and large dairy and cattle holdings.

- Set high environmental standards and objectives for **investments** funds going to modernization and productivity improvements, which currently represent the bulk of investment budget for farm holdings. Substantially increase the share of the budget going to targeted climate and environmental investments.
- Strengthen funding and incentive levels for **agroforestry** and **peatland rewetting** through eco-schemes, agri-environment-climate commitments, and advisory support. Introduce pilot projects for developing new agroforestry and paludiculture systems, as a game changer for increasing carbon stocks and improving resilience of agricultural landscapes. Improve also funding for non-peat wetland restoration and landscape features to support resilience and water retention at landscape level.
- **Strengthen the requirements in eco-schemes** in arable systems to set higher ambition for crop rotation, inclusion of legumes, residue management, and support for landscape features. Due to the large area that is targeted under eco-schemes any improvements in eco-schemes will have significant impacts for mitigation, resilience, and biodiversity.
- **Improve the funding and design of ambitious agri-environment-climate commitments** to further avoid deadweight requirements. Improve the flexibility for farmers and ensure sufficient advisory support to increase the interest and uptake in these measures.
- Significantly **strengthen animal welfare interventions** by shifting support from minimal technical improvements (such as only 10% increase in living space) to ambitious requirements for access to outdoors and grazing. Remove support for so-called mega-stables (units with more than 500LSU) under animal welfare and coupled payments.
- **Improve eligibility criteria** for CAP payments to include trees, woody strips, and agroforestry systems. Improve eligibility criteria to also expand the range of paludiculture crops eligible for CAP payments.
- Develop targeted investment and interventions to support the value chains and market development for organic products, and advisory and research capacity for organic farming.
- Focus on the development of institutional capacities, research, and advisory support for agroecological practices, agroforestry and paludiculture.
- Begin a dialogue and evidence-building to support a fundamental reorientation of the CAP post 2028.

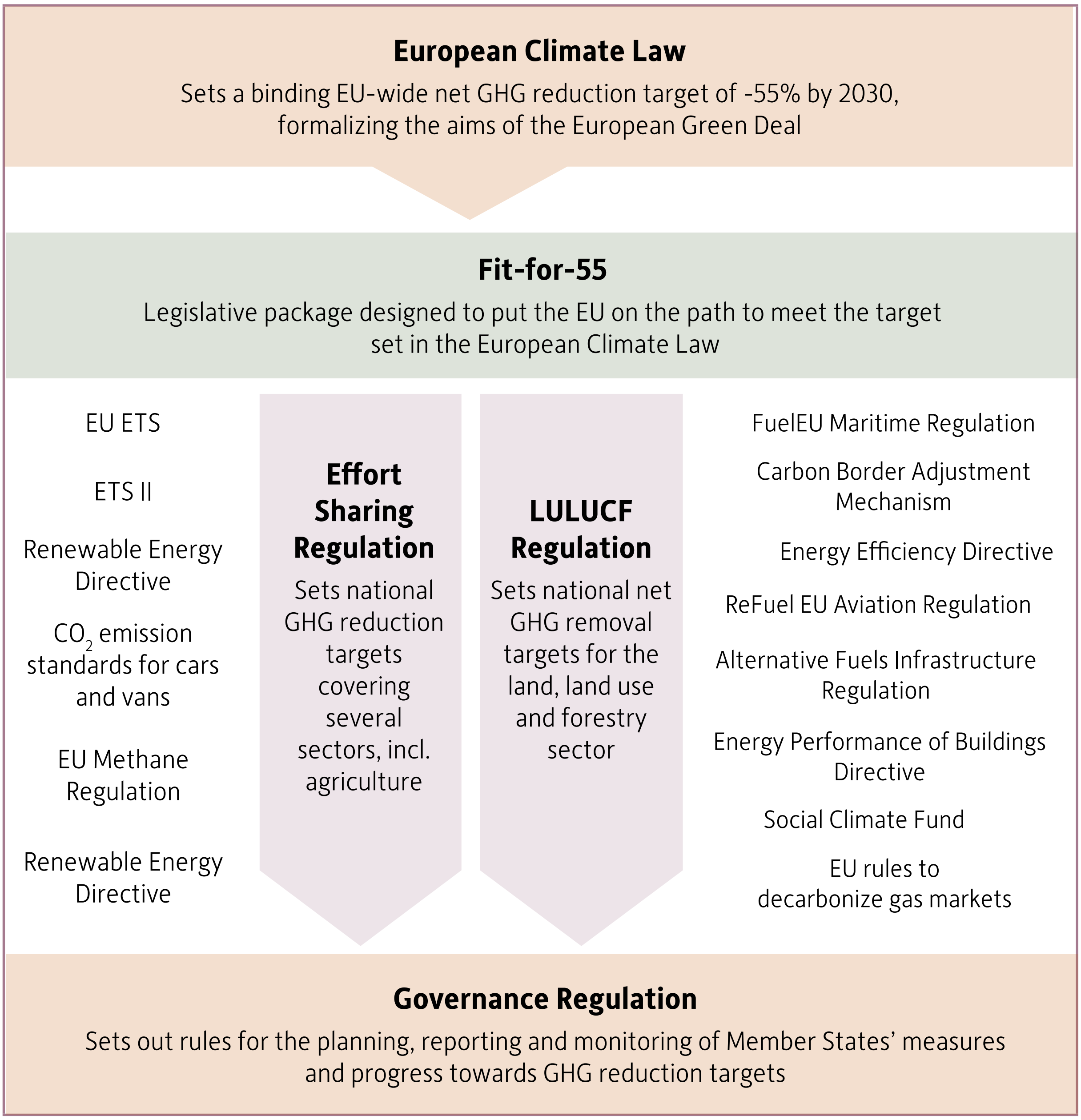
5 National Energy and Climate Plans (NECPs)

5.1 The significance and objectives of NECPs for agriculture and food

National Energy and Climate Plans (NECPs) are key strategic documents that outline how each Member State will contribute towards binding EU energy and climate targets over a 10-year period. Elements required under the NECPs are set out in Regulation (EU) 2018/1999 on the Governance of the Energy Union and Climate Action (aka the 'Governance Regulation').

Following the adoption of a binding EU-wide GHG reduction target of -55% by 2030 as part of the European Climate Law, Member States have been required to submit draft revised versions of their NECPs to the Commission by mid-2023, with the final submissions expected by mid-2024. These revisions are intended to reflect the new 2030 climate target, as well as the updated climate and energy legislation within the Fit-for-55 package.

Fig. 24: Climate legislative architecture: Agriculture and land use



Source: Own compilation.

NECPs must address five dimensions: energy security, internal energy market, energy efficiency, decarbonisation, and research, innovation, and competitiveness. For each dimension, Member States are required to set out the current policy situation, specific national objectives, and corresponding policies and measures. The NECP objectives and projections should be underpinned by an analytical assessment and be consistent with the long-term greenhouse gas emission reduction objectives under the Paris Agreement and Member States' long-term strategies.

Under the NECP framework, greenhouse gas emissions and removals associated with agriculture and food are addressed under the decarbonisation dimension. Member States are required to set out associated policies and measures, with a view to aligning with their obligations under the LULUCF Regulation, as well as their national targets and binding yearly reductions under the Effort Sharing Regulation. The NECPs are also expected to outline current emissions trends and projections of sectoral developments in the ESR and LULUCF sectors, at least until 2040. The key legislative targets relevant in the context of this analysis are presented in Table 6 below.

Table 6: Member States' GHG reduction and removal targets under EU and national legislation

Member State	2030 economy-wide GHG reduction target set at national level by MS[1]	2030 GHG reduction target for agriculture set at national level by MS	Original 2030 GHG reduction target for ESR sectors (2019)	Updated 2030 GHG reduction target for ESR sectors (2023)	2030 GHG net removals target under the revised LULUCF Regulation (2023)
Bulgaria	None	None	0%	-10%	-9.718 kt CO_2eq
Croatia	-45% cf. to 2005[2]	None	-7%	-16.7%	-5.527 kt CO_2eq
Czechia	None	None	-14%	-26%	-1.228 kt CO_2eq
Estonia	-70% cf. to 1990	None	-13%	-24%	-2.545 kt CO_2eq
Hungary	-50% cf. to 1990	None	-7%	-18.7%	-5.724 kt CO_2eq
Latvia	-38% cf. to 1990[3]	None	-6%	-17%	-600 kt CO_2eq
Lithuania	-30% cf. to 2005	-11% cf. to 2005	-9%	-21%	-4.633 kt CO_2eq
Poland	None	None	-7%	-17.7%	-38.098 kt CO_2eq
Romania	-78% cf. to 1990	-47% cf. to 1990	-2%	-12.7%	-25.665 kt CO_2eq
Slovakia	None	-10% (proposed) cf. to 2005	-12%	-22.7%	-6 821 kt CO_2eq
Slovenia	-55% (by 2033) cf. to 2005	-1% cf. to 2005	-15%	-27%	-146 kt CO_2eq

Source: Own compilation.

1 In the case of national targets (columns 2 and 3), targets are provided based on information included in Member States' NECPs, unless stated otherwise. In the case of ESR and LULUCF targets, the table references the targets set out in the relevant legislation (Regulation (EU) 2018/842 and Regulation (EU) 2018/841).

2 Croatia will reduce CO_2 emissions by 45% by 2030, our coal phase-out year is 2033. Available at: https://vlada.gov.hr/news/croatia-will-reduce-co2-emissions-by-45-by-2030-our-coal-phase-out-year-is-2033/33278

3 Latvia's strategy for achieving climate neutrality by 2050. Available at: https://likumi.lv/ta/id/342214-latvijas-strategija-klimatneitralitates-sasniegsanai-lidz-2050-gadam

While Member States typically outline both climate objectives imposed at national level and those set at EU level in their NECPs, only the latter are legally binding from the perspective of the Governance Regulation. In relation to agriculture, this means that the only binding targets fully subject to scrutiny and accountability vis-à-vis the Commission are those that are defined in the ESR and LULUCF Regulations (see the last two columns in Table 8).

Consequently, there is no mandated contribution from agriculture itself as a whole. Instead, emission reductions in the management of cropland and grassland contribute to the LULUCF target, while most other agricultural emission sources (such as livestock rearing and fertiliser use) are included under the aggregate, cross-sectoral ESR target. However, with heightened ambition following the recent revision of the ESR and LULUCF Regulation, it is evident that agriculture must contribute to emission reductions across these sectors – even as fewer than half of the analysed Member States have set national GHG reduction target for the agricultural sector.

Article 7 of the Governance Regulation also states that Member States must describe in their NECPs appropriate financing at national and regional level and provide an overview of the sources of investment, including the mobilisation of Union programmes and instruments, where applicable. While the Common Agricultural Policy is not referenced as a specific relevant financing mechanism in this context, its significance is underscored elsewhere in the Regulation, including as a key matter to be addressed in the Commission's recommendations on the draft NECPs.

Consequently, the NECPs have the potential to drive effective policy and allow stakeholders to gain insight into Member States' ambition and approaches to reducing emissions in the agricultural sector. Therefore, this chapter aims to provide an overview of CEE Member States' NECPs, including by:

- Investigating the extent to which the analysed countries use their NECPs to set out an increased level of ambition for net emission reductions across the agriculture and land sectors.
- Investigate the types of measures that the analysed countries are planning to employ as part of their climate mitigation efforts in the agricultural sector.
- Ascertain the degree to which the analysed countries utilise CAP funds and measures outlined in their CSPs to achieve climate objectives in the agricultural sector, and whether they identify the need for CSP revision to align with the more stringent ESR and LU-LUCF targets.

5.2 NECP measures and projections for the agricultural and LULUCF sectors

By the end of 2023, nine out of the eleven Member States covered in this report submitted drafts of their updated NECPs and subsequently received country-specific recommendations from the Commission. Bulgaria and Poland delayed their submissions until 2024 and, at the time of writing, the results of the Commission's evaluation of their plans are still pending.

While the draft plans vary considerably in the level of detail and ambition of the described policies and measures for the agricultural and LULUCF sectors, the majority do not set a clear pathway to meeting their obligations under the LULUCF Regulation or increasing the contribution of the agricultural sector to the ESR target.

Table 7: NECP progress on ESR and LULUCF targets and mitigation in agriculture and land sectors

Country	Is the MS projected to meet binding 2030 targets with additional measures[4]?		Does the NECP contain a list of additional measures?		Measure-specific information includes:			
	ESR target	LULUCF target	Agriculture	LULUCF	Expected emission reduction	Budget	Period of implementation	Monitoring indicators
Bulgaria	No	No	Not included	Not included	No	No	No	No
Croatia	Yes	No	Included	Not included	No	Yes	Partially	Partially
Czechia	No	No	Not included	Not included	No	No	No	No
Estonia	No	No	Not included[5]	Not included	No	No	No	No
Hungary	Unclear[6]	No	Not included	Not included	No	No	No	No
Latvia	No	No	Not included	Not included	No	No	No	No
Lithuania	No	No	Included	Included	Yes	No	Yes	Yes
Poland	No	No	Not included	Not included	No	No	No	No
Romania	No	No	Included	Not included	No	No	Partially	No
Slovakia	No	No	Not included	Included	No	No	No	No
Slovenia	Yes[7]	Unclear[8]	Not included	Not included	No	No	No	No

Source: Own compilation.

4 In accordance with the Governance Regulation, projections with additional measures (WAM) take into account policies and measures which have been adopted and implemented, as well as those that are under discussion and have a realistic chance of being adopted and implemented after the date of submission of the integrated national energy and climate plan.

5 Estonia's NECP contains just one additional measure addressing manure management improvements (PM20).

6 Hungary's NECP includes projections which suggest that the country is on track to overachieve its ESR reductions target by 5.1 percentage points. However, it is unclear how these reductions are envisaged to be achieved in practice. The EEA's assessment published in September 2023 indicated that Hungary was projected to fall short of its 2030 ESR target by app. 4 percentage points.

7 The EEA's assessment published in September 2023 indicated that, with additional measures, Slovenia was projected to miss its 2030 ESR target by a narrow margin. However, the Commission's NECP assessment (based on the draft NECP, as well as informal bilateral exchanges, which are part of the iterative process established under the Governance Regulation) concluded that Slovenia was on track to meet its target.

8 The Commission's assessment found that although Slovenia's projections show it will meet its 2030 LULUCF target, the data basis is unclear due to the absence of policies and measures in the draft plan. The EEA's September 2023 assessment also indicated Slovenia would meet its target. The 2030 target is based on the average GHG inventory data from 2016-2018, during which Slovenia had a bark beetle outbreak, temporarily turning its LULUCF sector into an emissions source. Since 2019, Slovenia has recorded an annual LULUCF sink exceeding-3 Mt CO_2eq (EEA 2023), suggesting it could easily achieve the 2030 target of-146 kt CO_2eq without additional efforts, which may not reflect its actual sink potential.

NECP GHG projections point to insufficient climate action in the agricultural and land sectors

Three of the analysed Member States **(Lithuania, Slovenia, Slovakia)** have set national GHG reduction targets for the agricultural sector, as detailed in Table 7, and their NECPs demonstrate that they are on track to achieve those. Lithuania's NECP shows that the country expects to meet its nationally determined target of -11% emissions reductions by 2030 with additional measures; it also sets an interim target of -3,8% by 2025, suggesting that a more significant ramp-up of mitigation efforts in the second half of the decade. According to the EEA assessment (2023b), Lithuania is expected to only narrowly miss the ESR 2030 target. Slovenia and Slovakia project meeting their national targets of -1% and -10% agricultural emission reductions, respectively, with additional measures. Despite Slovenia's arguable inadequate target of -1%, combined efforts across sectors are expected to bring it close to achieving its ESR target. Slovakia's post-2020 actions contribute relatively little (-3%) to meeting its proposed -10% 2030 agricultural emissions reduction target, and the EEA (2023b) assessment indicates it is not on track to meet its 2030 ESR target.

While **Croatia** does not set a sectoral target for agriculture or provide a clear description of the future GHG trajectory in its NECP, the EEA (2023b) analysis suggests that, with additional measures, the cross-sectoral 2030 ESR target should be within its reach.

Romania's NECP projects that its agricultural sector will narrowly miss the 2030 national target of 47% emission reductions compared to 1990. Notably, the reduction in emissions expected in the present decade, until 2030, is expected to be minimal – a decrease of less than 0,2 Mt CO_2eq; Romania is also expected to miss its 2030 cross-sectoral ESR target by a significant margin.

Projections in the NECPs submitted by **Estonia, Hungary**, and **Czechia** show that emissions in their agricultural sectors are expected to increase in the period up to 2030, while **Latvia's and Bulgaria's** NECPs lacks any projections altogether. None of these countries are currently projected to meet their ESR targets with additional measures based on the EEA analysis.

None of the analysed countries provide a clear scenario description and trajectories demonstrating that they are on track to meet their carbon removal targets under the LULUCF Regulation[9]. **Lithuania** and **Slovakia** are the only among analysed countries that include a list of additional measure for the LULUCF sector. While Lithuania's projections show a relatively small gap between the 'with additional measures' scenario and the national LULUCF target (378 ktCO_2eq), with further measures to be proposed in the final version of the NECP, Slovakia's scenarios point to a worsening trend up until 2035, with only a slight uptick in removals by 2040.

Estonia, Croatia, and **Czechia** acknowledge that current policies are likely to be insufficient to achieve their updated LULUCF targets and note the need for further measures in their NECPs. In addition, Czechia's plan indicates that complying with the 'no-debit rule' (i.e. the requirement for LULUCF emissions not to exceed removals) in the period up until 2025 will be challenging. All three countries indicate in their plans that further options are currently being evaluated. **Slovenia's** NECP does not explicitly state whether the country is on track to meet its 2030 LULUCF target, however, it suggests that "some additional measures relevant for reducing emissions in the sector are under preparation."

Hungary, Latvia and **Romania** provide little to no detail on their measures or forward-looking scenarios for the sector and have indicated that 'with additional measures' scenarios will be included in the final version of their NECPs. **Bulgaria** does not include forward-looking projections and provides no indication of plans to incorporate additional measures and scenarios in its final version.

9 See previous footnote for further comments on Slovenia's plan.

CAP is the main tool used to deliver emission reductions in the sector, but it lacks a comprehensive mitigation assessment.

None of the analysed countries provide information on the alignment of their CAP Strategic Plans with the updated ESR and LULUCF targets or indicate that a revision of the CSPs will be necessary to support the achievement of those targets. The NECPs also do not quantify the mitigation potential of individual CAP measures, nor do they elaborate on the possible negative climate outcomes associated with direct support payments and other CAP funding.

While clarity is lacking regarding the scope of the contribution of the CAP towards climate mitigation objectives, among the four Member States that have included a more comprehensive list of measures (i.e. Croatia, Slovenia, Lithuania and Romania), the CAP is referenced in the description of all or the vast majority of measures. Where funding information is lacking at individual measure level, isolating measures which are additional to those included in the CAP Strategic Plans is difficult – most measures with a direct emission reduction potential appear to be financed with the use of CAP funding. The countries that do not include a more detailed list of measures in their NECPs (i.e. Slovakia, Estonia, Czechia, Hungary, Latvia, Bulgaria) focus almost exclusively on the CAP as a reference point for mitigation efforts, limiting the description of measures in the agricultural sector to a brief summary of key areas of intervention in the CAP.

Overall, while the Member States included in this analysis do not provide a comprehensive assessment of the expected climate mitigation outcomes of their CSP measures, the CAP remains a key tool intended to facilitate emission reductions and removals in the AFOLU sector. The overreliance on the CAP's contribution to the climate mitigation effort, without a robust evaluation of the associated mitigation potential, is likely to be an important factor behind the failure to achieve substantial emission reductions in the agricultural sector, and impede Member States' progress towards the 2030 targets set out in the ESR and LULUCF Regulations.

NECP GHG projections point to insufficient climate action in the agricultural and land sectors

Three of the analysed Member States (Lithuania, Slovenia, Slovakia) have set national GHG reduction targets for the agricultural sector, as detailed in Table 7, and their NECPs demonstrate that they are on track to achieve those. Lithuania's NECP shows that the country expects to meet its nationally determined target of -11% emissions reductions by 2030 with additional measures; it also sets an interim target of -3,8% by 2025, suggesting a more significant ramp-up of mitigation efforts in the second half of the decade. According to the EEA assessment (2023b), Lithuania is expected to only narrowly miss the ESR 2030 target. Slovenia and Slovakia project meeting their national targets of -1% and -10% agricultural emission reductions, respectively, with additional measures. Despite Slovenia's arguably inadequate target of -1%, combined efforts across sectors are expected to bring it close to achieving its ESR target. Slovakia's post-2020 actions contribute relatively little (-3%) to meeting its proposed -10% 2030 agricultural emissions reduction target, and the EEA (2023) assessment indicates it is not on track to meet its 2030 ESR target.

While Croatia does not set a sectoral target for agriculture or provide a clear description of the future GHG trajectory in its NECP, the EEA (2023b) analysis suggests that, with additional measures, the cross-sectoral 2030 ESR target should be within its reach.

Romania's NECP projects that its agricultural sector will narrowly miss the 2030 national target of 47% emission reductions compared to 1990. Notably, the reduction in emissions expected in the present decade, until 2030, is expected to be minimal – a decrease of less than 0,2 Mt CO_2eq; Romania is also expected to miss its 2030 cross-sectoral ESR target by a significant margin.

Projections in the NECPs submitted by Estonia, Hungary, Poland and Czechia show that emissions in their agricultural sectors are expected to increase in the period up to 2030, while Latvia's and Bulgaria's NECPs lacks any projections altogether. None of these countries are currently projected to meet their ESR targets with additional measures based on the EEA analysis.

None of the analysed countries provide a clear scenario description and trajectories demonstrating that they are on track to meet their carbon removal targets under the LULUCF Regulation. Lithuania and Slovakia are the only among analysed countries that include a list of additional measures for the LULUCF sector. While Slovakia's scenarios point to a worsening trend up until 2035, with only a slight uptick in removals by 2040, Lithuania's projections show a relatively small gap between the 'with additional measures' scenario and the national LULUCF target (378 ktCO_2eq), with further measures to be proposed in the final version of the NECP.

Estonia, Croatia, and Czechia acknowledge that their current policies are likely to be insufficient to for the achievement of the updated LULUCF targets and note the need for further measures in their NECPs. In addition, Czechia's plan indicates that complying with the 'no-debit rule' (i.e. the requirement for LULUCF emissions not to exceed removals) in the period up until 2025 will be challenging. All three countries indicate in their plans that further options are currently being evaluated. Slovenia's NECP does not explicitly state whether the country is on track to meet its 2030 LULUCF target, however, it suggests that "some additional measures relevant for reducing emissions in the sector are under preparation." Similarly, Poland's NECP indicates that the preparation of the 'with additional measures' scenarios is currently underway. Based on the presented projections, the net removals in the country's LULUCF sector are projected to decline significantly by 2030, indicating a widening gap between the projected trend and Poland's national target.

Hungary, Latvia, Romania provide little to no detail on their measures or forward-looking scenarios for the sector and have indicated that 'with additional measures' scenarios will be included in the final version of their NECPs. Lastly, Bulgaria does not include forward-looking projections and provides no indication of plans to incorporate additional measures and scenarios in its final version.

CAP is the main tool used to deliver emission reductions in the sector, but it lacks a comprehensive mitigation assessment

None of the analysed countries provide information on the alignment of their CAP Strategic Plans with the updated ESR and LULUCF targets or indicate that a revision of the CSPs will be necessary to support the achievement of those targets. The NECPs also do not quantify the mitigation potential of individual CAP measures, nor do they elaborate on the possible negative climate outcomes associated with direct support payments and other CAP funding.

While clarity is lacking regarding the scope of the contribution of the CAP towards climate mitigation objectives, among the four Member States that have included a more comprehensive list of measures (i.e. Croatia, Slovenia, Lithuania and Romania), the CAP is referenced in the description of all or the vast majority of measures. Where funding information is lacking at individual measure level, isolating measures which are additional to those included in the CAP Strategic Plans is difficult – most measures with a direct emission reduction potential appear to be financed with the use of CAP funding. The countries that do not include a more detailed list of measures in their NECPs (i.e. Slovakia, Estonia, Czechia, Hungary, Latvia, Bulgaria, and Poland) focus almost exclusively on the CAP as a reference point for mitigation efforts, limiting the description of measures in the agricultural sector to a brief summary of key areas of intervention in the CAP.

Overall, while the Member States included in this analysis do not provide a comprehensive assessment of the expected climate mitigation outcomes of their CSP measures, the CAP remains a key tool intended to facilitate emission reductions and removals in the AFOLU sector. The overreliance on the CAP's contribution to the climate mitigation effort, without a robust evaluation of the associated mitigation potential, is likely to be an important factor behind the failure to achieve substantial emission reductions in the agricultural sector, and impede Member States' progress towards the 2030 targets set out in the ESR and LULUCF Regulations.

CEE Member States' NECPs lack sufficient detail on the scope and mitigation impacts of presented measures

A majority of the analysed NECPs lack sufficient detail to determine the effectiveness of the planned measures and implementation mechanisms, and fail to reflect the increased ambition required under the revised targets. Descriptions of activities undertaken under individual measures are largely insufficient, and the information regarding implementation timelines, and monitoring is absent in most cases.

Among the analysed plans, Lithuania's and Croatia's NECPs stand out for their detailed sets of agricultural measures. Lithuania is the only CEE country that quantifies the mitigation potential of individual measures and includes activity indicators with the associated quantitative targets. Croatia's NECP includes arguably the most comprehensive information around the activities planned under each measure, and is the sole CEE Member State to outline financing needs at individual measure level.

Romania's and Estonia's NECPs offer limited insight into a smaller number of measures, providing only some ad-hoc information on implementation timelines and planned activities. Czechia, Bulgaria, and Hungary only provide summaries of measures detailed in their CAP SPs without quantifying their mitigation impact. Poland's NECP technically includes a list of measures, but it primarily focuses on separating existing CAP components like conditionalities and eco-schemes. Slovenia briefly mentions standalone measures but lacks detail on implementation parameters, while Latvia offers no specific measure-related information at all.

Types of measures

The limited level of detail provided on implementation mechanisms poses a challenge in understanding the nature of many measures, making it difficult to categorise them as either efficiency-focused or part of a holistic agroecological approach. Additionally, most Member States do not offer sufficient information to assess the relative importance or resources allocated to technical/efficiency measures versus agroecology measures.

Across the region, climate mitigation action in the livestock sector, in relation to emissions from enteric fermentation and manure management, appears to rely exclusively on technical/efficiency measures. This trend raises concerns given that livestock represents the primary source of emissions from agriculture across all analysed Member States, except Bulgaria, and accounts for a substantial proportion of emissions in the ESR sector. It is worth noting that NECPs from countries beyond the analysed sample illustrate potential models for implementing measures that encourage absolute reductions in livestock numbers, as evidenced by e.g. Luxembourg's measure No 701 - Aid to reduce the livestock load.

While several of the analysed NECPs mention the promotion of organic farming, the scale of potential mitigation impacts remains unclear. Furthermore, nature-based solution measures with potentially high mitigation potential are not commonly included in NECPs; for example, dedicated agroforestry measures are only explicitly mentioned by two Member States, Lithuania and Croatia, where the focus remains on research and information dissemination rather than implementation.

Encouragingly, some Member States with significant UAA on peatlands, such as Lithuania and Estonia, present dedicated measures targeting related emissions. However, the effectiveness of these measures and their ambitiousness remain unclear.

Among the analysed NECPs, only Lithuania outlines measures that target the value chain and demand side. These initiatives encompass promoting the consumption of organic products (including green procurement and price difference compensation in pre-schools) under measure A2-E/P, as well as advocating for an environmentally friendly diet through communication and education campaigns (A18-P).

Table 8: Types of measures for the agricultural and LULUCF sectors in the analysed draft NECPs

	Technical measures	Nature-based / agroecology measures	Other[10]
Croatia	**POLJ-1** Improving storage capacity and practices when handling manure	**POLJ-3** Improving and changing the soil tillage system *(reduced tillage)*	**POLJ-9** Hydro-amelioration interventions and systems of protection against natural disasters
Croatia	**POLJ-2** Anaerobic decomposition of manure and biogas production	**POLJ-4** Extension of crop rotation with a higher share of legumes	**POLJ-8** Agroforestry *(research measure)*
Croatia	**POLJ-6** Improvement of mineral fertilizer application methods	**POLJ-5** Intensification of crop rotation by using intercrops	**POLJ-10** Introduction of new cultivars, varieties and crops *(adaptation-oriented)*
Croatia	**POLJ-7** Improvement of organic fertilizer application methods	**LUF-5** Land under managed crops	**LUF-1** Development of the Maintenance plan of the National Information System for land in the Republic of Croatia
Croatia		**LUF-6** Managed grassland	**LUF-7** Implementation of technical projects and scientific research in the LULUCF sector
Estonia	**PM3** Tangible and intangible investments by farmers *(precision fertilisation, manure storage and injection equipment)*	**PM1** Organic farming	**PM4** Knowledge transfer and information actions
Estonia	**PM8** Investments to improve farm performance *(new animal waste management systems and bioenergy)*	**PM2** Agri-environment-climate measures *(environmentally friendly horticulture, soil management, maintenance of semi-natural habitats)*	**PM5** Advisory services, farm management and farm relief services
Estonia	**PM11** Investments in the valorisation of bio-resources *(increase in biomethane production)*	**PM6** Climate and Environment Plan: environmentally friendly management *(broad-based CSP measure supporting the use of agricultural methods that protect/improve soil and water condition and enhance biodiversity and landscape diversity)*	**PM18** Investments for energy savings and renewable energy in greenhouses and vegetable warehouses
Estonia	**PM20** Improving manure management	**PM7** Climate and Environment Plan: eco-scheme for organic farming	**PM19** Support for the development of the Knowledge Transfer and Innovation System (AKIS)

10 Measures for which climate mitigation is not a direct or primary outcome, or which result in emission reductions accounted for under CRF category 1.A.4.c Energy – Agriculture/Forestry/Fishing.

	Technical measures	Nature-based / agroecology measures	Other[10]
Estonia	**PM17** Replacement of mineral fertilisers by organic fertilisers-replacement with biogas digestate, lake sludge or sapropeel.	**PM9** Animal welfare aid *(support for extensive grazing "without favouring an increase in total number of animals")*	**PM21** Audits on larger farms
		PM10 Support for soil and water protection *(organic soils protection)*	**PM22** Studies and pilot projects
		PM12 Climate and Environment Plan: EFAs *(establishment of non-productive areas and landscape features on arable land)*	**PM23** Advisory allowance
		PM13 Climate and Environment Plan: maintaining ecosystem services on arable land *(conservation of diverse agricultural landscapes, landscape features and natural areas)*	
		PM14 Support for maintaining valuable permanent grassland	
		PM15 Minimum soil cover to avoid bare soil in periods that are most sensitive	
		PM16 Aid for the maintenance of wet meadows	
		PM17 Replacement of mineral fertilisers by organic fertilisers – replacement with compost or biochar	
Lithuania	**A1-E/P** Climate-friendly livestock farming *(manure management equipment / technologies)*	**A4-E** Extensive grassland maintenance	**A2-E/P** Promoting the consumption of organic products
	A3-E/P Expansion of precision fertilisation	**A6-E** Development of protein crops	**A10-E** Boosting bioeconomy businesses
	A8-E Amendment of the composition of feed	**A7-E** Limiting tillage	**A13-E** Discontinuation of tax relief *(fossil fuels used for agricultural machinery)*
	A21-P Balanced fertilisation system	**A9-E** Organic farming	**A14-E** Reducing the use of fossil fuels
		A11-E Nature-friendly orchard and berry management	**A15-E** Review of Technology Cards
		A12-E Sustainable horticulture	**A16-E** Encouraging research
		L1-E Restoration of peatlands (restoration of hydrological regime on agricultural land)	**A17-E** Information and consultation
		L3-E Conservation of wetlands	**A18-P** Environmentally friendly diet
		L4-E Promotion of catch crops	**A19-P** Sustainable use of public land
		L5-E Promoting plant change (crop rotation)	**A20-P** Inventory of GHGs on farms
		L6-E Peatland restoration *(replacement of arable peatland with grassland)*	**A22-P** AD-powered technique *(replacing fossil-fuel-powered agricultural machinery and vehicles with second-generation biofuels and electric techniques)*
		L7-E Promotion of green cover	**L11-E** Development of agroforestry and agro-horticulture *(research measure)*
		L8-E Retention of landscape features	
		L13-P Promotion of carbon stock farming *(on agricultural land)*	

	Technical measures	Nature-based / agroecology measures	Other[10]
Romania	**PAM 9** Reduction of emissions from enteric fermentation *(intensification of livestock production, nutrition management)*	**PAM 10** Increasing agricultural residues management *(no burning of agricultural residues by 2030)*	**PAM 12** Increasing the agrisolar production
	PAM 11 Reduction of methane emission level from manure management and biogas production		**PAM 14** PV systems in agriculture
			PAM 15 Renewal of the agricultural machinery and equipment
			PAM 16 Establishment of agricultural associations
Slovakia		Implementation of measures aimed at increasing carbon sequestration in agricultural soils and maintaining high levels of organic carbon in carbon-rich soils.	
		Maintenance and restoration of grassland.	
		Transfers of unused agricultural land to forest land	

Source: Own compilation.
Note: Only measures relevant to agriculture and food are included, and not forestry or other non-agriculture measures.

5.3 Conclusions

Overall, none of the analysed countries are projected to meet both their ESR and LULUCF targets based on the draft updated projections, highlighting the need for a step-change in mitigation efforts in the agricultural and land sectors in CEE countries.

NECPs are a key tool bridging agricultural and climate objectives and providing stakeholders with the opportunity to gain insight into the approaches and progress that countries are making in the transition to more sustainable agriculture. The European Commission's expectation, explicitly mentioned in the recommendations that followed the review of draft NECPs[11], is that Member States:

- Set out cost-efficient additional policies and measures, including for the agricultural sectors, and for methane and N_2O gases from agriculture to meet the national greenhouse gas target under the ESR, and provide projections to show how the existing and planned policies will deliver on the target, while clearly spelling out their scope, timeline and, where possible, expected greenhouse gas reduction impact, including for measures in Union funding programmes, such as the Common Agricultural Policy.
- Set out a concrete pathway towards reaching the national LULUCF target and include additional measures in the LULUCF sector, detailing their timing and scope and quantifying their expected impacts to ensure that greenhouse gas removals are effectively aligned with the 2030 EU net removal target, as well as providing clear information on how public funds (both Union funds, including the Common Agricultural Policy, and State aid) and private financing through carbon farming schemes are consistently and effectively used to achieve the net removal national target.

NECPs could therefore be a driver for effective country-level policy and strategy design for climate mitigation in the agricultural sector. However, in practice, few Member States have thus far demonstrated that they are likely to deliver on the Commission's recommendations.
The Governance Regulation, structured around the five dimensions of the energy union, historically prioritizes decarbonisation and the energy sector. Consequently, AFOLU sectors appear to receive less attention in the planning and execution of NECPs.

11 For example, https://commission.europa.eu/document/download/e3c6b2f0-87ab-4e99-9525-a88d82753d5a_en?filename=Recommendation_draft_updated_NECP_Slovakia_2023.pdf

The emphasis on quantitative climate targets under the decarbonisation dimension also means that technical measures which yield easily quantifiable emission reductions may be favoured over holistic approaches that offer multiple co-benefits within agriculture.

Moreover, while Member States are obligated to showcase progress towards the cross-sectoral ESR target, the absence of binding sectoral targets for agriculture means that mechanisms for enforcing higher ambition in NECPs are lacking. Consequently, the agricultural sector's contribution remains minimal. Additionally, the lack of targets for non-CO2 emissions in the ESR regulation[12] further undermines motivation to meaningfully address major sources of agricultural emissions, such as methane from enteric fermentation and nitrous oxide from fertilizers.

At a minimum, Member States should aim to quantify the climate mitigation potential of their CAP interventions. This quantification could subsequently serve as a basis for evaluating the need for additional policies and revisions to CAP plans, as well as identifying key sources of emissions which need to be urgently addressed.

12 During the Effort Sharing Regulation revision process in 2022, the European Parliament adopted a position which would have required the Commission to put forward a legislative proposal fixing EU-wide targets for non-CO_2 emissions covered by the ESR by 2023. However, this did not make it into the final text of the regulation. https://www.europarl.europa.eu/legislative-train/package-fit-for-55/file-review-of-the-effort-sharing-regulation

6

Developing policies to support a shift to sustainable food consumption

6.1 Introduction

As outlined earlier in the report, sustainable food consumption involves: a move towards more plant-based diets, increased consumption of organic foods, and reducing food waste.

In CEE countries there are various activities ongoing that contribute to increasing awareness and support for sustainable food consumption. For example, the activities around reducing food waste have been well developed for some time, driven in large part also by the "EU Platform on Food Losses and Food Waste", which was launched 2016 convening EU institutions, experts, and all stakeholders to support defining necessary measures to prevent food waste, share best practices, and evaluate the progress achieved over time. Moreover, various awareness raising activities are ongoing, including activities around increasing awareness of climate impacts of foods, or awareness raising campaigns around healthy diets run by health ministries. There is also increasing demand for plant-based foods and various activities and projects that work around the topic of organic foods in schools. In Poland, consumer cooperatives increase awareness of sustainability issues around foods and offer an important vehicle for marketing sustainable foods. At city level, municipalities work on promoting access to urban gardening, or access to organic foods in schools (Estonia, Croatia, and others), some countries also have targets for increasing the share of organic foods in public institutions (for example, Slovenia). Although a detailed overview of the different types of activities around sustainable food consumption is out of the scope of this report we can say that these activities are growing, yet they also remain fragmented.

To increase the impact of the various bottom-up activities and speed up the process of moving towards more sustainable food consumption, there are various policy tools that can be newly implemented or strengthened, and better integrated with policies on the production side of the agri-food system.

Importantly, to design effective policies for promoting behavioral change towards more sustainable food consumption, the first key step is to shift the perspective **from individual responsibility to the role that food environments play in determining food consumption**. Typically, when speaking about changes in food consumption, "consumer responsibilization" (Giesler & Veresiu, 2014; Kipp & Hawkins, 2019) has been the primary approach, placing the responsibility for ethical and sustainable choices in the hands of consumers, based on the assumption that enlightened consumers can make the "right" choice. This approach suggests that consumer demand determines supply. In other words, if consumers stop demanding certain unsustainable products, their production will eventually cease. This perspective also aligns with the idea that market supply is simply a response to consumer demand.

However, recently there has been growing recognition that individual decisions are not made in isolation but are significantly influenced by the contexts in which they occur. For example, factors such as the availability of sustainable products, pricing strategies, marketing tactics, and social norms all play a role in guiding consumer behavior. In other words, decision environments play a central role shaping consumer behavior (see e. g. SAPEA, 2023; SAM, 2023).

Individual behavior always takes place in relation to its environment. This evolving understanding is reflected in the growing field of behavioral public policy, which examines how various factors in the decision-making environment can influence consumers choices and behaviors. This approach recognizes that while consumer responsibility is important, it is equally crucial to create an environment that facilitates and encourages sustainable decision-making. By focusing on the characteristics of decision environments, policies can create conditions where making sustainable choices becomes easier, more intuitive, and more aligned with social norms.

A comprehensive and integrated strategy for promoting sustainable food consumption would involve not just educating and informing consumers (e.g., in the form of educational campaigns or labels) but also actively shaping the decision environment (e.g., increasing (decreasing) the availability, accessibility, affordability and visibility of sustainable (unsustainable) products) for instance in out-of-home catering to promote more sustainable food choices.

Countries may already have some or a number of these instruments in place, but they can be further improved to better simultaneously address the health, environmental and climate considerations in sustainable food consumption.

6.2 Policy instruments for promoting sustainable food consumption

Sustainable food consumption can be promoted by implementing approaches and instruments that make the sustainable choice the easy choice, i.e. by **shaping the food environments** in such a way as to ensure ensuring that sustainable and healthy products and meals are the most affordable, available, accessible, and enjoyable. At the same time, it is also important to support **the development of capabilities and competences**.

Policy instruments for shaping the food environment can target socio-cultural, physical, and economic contexts in which individuals interact with the food system to make choices about acquiring, preparing, and consuming food (EPHA, 2019). There are several effective approaches and instruments that can be used to both the specific contexts of individual interaction with the food system and the acquisition of capabilities and competences.

6.2.1 Campaigns, food advertising and marketing

Campaigns, food advertising and marketing address the socio-cultural contexts in which people make their decisions about food consumption. They can help to make a sustainable diet more attractive and desirable.

Awareness campaigns can help to increase acceptance for the introduction of “tougher” measures (e.g. taxes etc.) by improving public awareness of the problem. Information campaigns that explain the consequences of diets, e.g. regarding animal welfare, health, climate protection, etc., are widespread. It seems more promising to focus on changing consumption patterns (Leenaert, 2022), for example, by providing recipes or instructions, preparation methods, product variants, examples of integration into meals, tastings, information on vegetarian restaurants, e.g. via city maps, etc. Campaigns in which plant-based food is communicated as the ‘new normal’ can influence social norms and represent a promising approach that should be investigated further (social norms campaign). Social norms campaigns address several powerful drivers of behavior.

Campaigns can work with very different elements: For example, with role models such as influencers, actors, chefs, etc. Comparative feedback in campaigns can help to induce the further development of social norms (e.g. through the message “X% of work colleagues (already) eat flexitarian”). Another element can be the communication of voluntary commitments, e.g. in the form of publicly expressed intentions (so-called “pledges”, voluntary promises, or assurances to achieve a certain goal or support a certain action). These can apply for a limited period, for example, as part of campaign weeks (e.g. “Veganuary”).

In principle, campaigns can use a variety of formats: Print materials, workshops, courses, training, seminars; competitions, events (cooking events, trade fair stands, public appearances and campaigns, information stands, flash mobs, etc.); school or educational materials; games; social media; internet (podcast, blog, homepage, e-learning, video tutorials); newsletters/circulars. In any case, target group-specific adaptation and orientation to different social identities (level of education, gender, culture, age, etc.) is important for effectiveness (Quack et al., 2023).

Food advertising and marketing influence and direct perception - often unconsciously for the target audience. It can be assumed that they influence social norms and have an impact on attitudes, values, and emotions; however, there is a need for more research on this. They work, for example, with visual appeal (posters, advertisements, brochures) and product and packaging design. Von Philipsborn (2021) points out that advertising expenditure in Germany for fruit and vegetables is very low compared to other product groups, such as confectionery: 870 million EUR were spent on advertising for sweets in 2017, compared to just 17 million EUR for fruit and vegetables in the same year. 81,9 million EUR was spent on advertising for meat and fish products in 2017 (Statista, 2020). In comparison, only 15,7 million EUR were planned for the budget item "Measures to promote a balanced diet" in the federal budget in 2020 (von Philipsborn, 2021).

One political approach is the regulation of advertising for sugar, for which there is already a draft law in Germany that is intended to restrict advertising aimed at children for foods with too much sugar, fat or salt. However, this draft has not yet passed the cabinet. Chile, an international pioneer in the fight against malnutrition and diet-related diseases, introduced a ban on advertising unbalanced foods between 6 a.m. and 10 p.m. in 2018. A recent study using soft drinks as an example shows that children and young people are seeing significantly fewer advertisements for unhealthy foods on television, with healthier products being advertised instead (Stoltze et al., 2024)

In addition, the regulation of advertising for meat, e.g. in the form of restrictions through a price advertising ban, spatial and temporal restrictions on advertising or even comprehensive advertising bans for certain forms of meat or meat products ("cheap meat") (on relevant legal issues in this context see Gawel, 2021; Wollenteit, 2021). It is also conceivable that the food and catering industry can make voluntary commitments, e.g. to advertise more plant-based, regional, and organic products or to refrain from misleading advertising (Quack et al., 2023). To ensure the implemented measures have the intended effect, robust mechanisms for monitoring compliance and enforcement of penalties for violations should be established.

Implementing restrictions on advertising unhealthy food options, especially to vulnerable groups such as children, requires a supportive legal and regulatory environment. The involvement of food industry players up to a certain extent is important. For example, in the case of Chile, it proved pivotal that the food industry had the opportunity to thoroughly articulate its viewpoints during public hearings. However, the subsequent development of new rules and restrictions largely occurred independently of the industry's influence. Collaborating closely with the food industry throughout the policy-making process often results in more relaxed regulations and increased exceptions.

6.2.2 Educational activities and advisory services

Educational and advisory services can enable the acquisition of appropriate capabilities and competences to actively apply healthy and sustainable consumption e.g. through cooking skills, gardening skills, but also through the knowledge of the effects of an unsustainable diet and how to change this diet.

Food education for general population encompasses both formal educational programs, such as in daycare centers and schools, and non-formal educational programs for people of different ages, such as adult education programs. Educational programs represent an approach to strengthening the necessary skills, specifically the acquisition of knowledge, the acquisition of food preparation skills and the development of self-regulation skills. Educational programs can take different formats, e.g. teaching knowledge and cooking skills in class, lectures, cooking courses, seminars, workshops, creating a school garden, competitions, etc. The target group-specific adaptation of content, formats and presentation is part of the design of educational offers (Quack et al., 2023).

Implementing comprehensive education programs requires significant resources, including trained educators, materials, and infrastructure. Ideally, food education is integrated into formal education systems to ensure that children and young adults acquire knowledge and skills from an early age "shaping the habits of future generations"). Learning should not remain theoretical, but include hands-on learning (practical application, develop competences) to make the learning more engaging, memorable, and applicable to daily life. This might include cooking classes, gardening etc. see food schools in Copenhagen as good practice examples or programs like the "GemüseAckerdemie" oder "AckerKita" in Germany) It is not just about imparting knowledge, but rather about effectively changing nutritional behavior by designing programs in such a way that they create spaces in which skills can be developed, self-efficacy is addressed and children and young people know how sustainable consumption can be implemented and is fun at the same time.

Vocational training and further education courses for specific professional groups, such as in medicine, gastronomy and education can support the development of special skills and competencies. Depending on the professional orientation, this leads to better offers, e.g. in the kitchen to tastier, plant-based, low-sugar, organic dishes and a larger selection, for example in out-of-home catering. Vocational education and training can include various formats such as lessons at vocational school, additional training, electives, lectures, seminars, final theses, internships, etc. (Quack et al., 2023).

Encouraging innovation in plant-based cooking and sustainable food practices can prepare professionals to lead industry changes. In general, the training programs must be aligned with industry needs to ensure that graduates have the skills demanded by employers, particularly in fields influencing food choices (e.g., gastronomy, healthcare). Also, as the food industry, especially in regard to plant-based alternatives (processed as well as unprocessed) is rapidly evolving, the programs should be designed such that they allow for dynamic adaption and to allow for continuous updates to remain relevant and impactful.

Dietary and medical advisory services are more individually tailored to those seeking advice than educational offers. For example, advice can include the development of personal action plans or - possibly also supported by digital services - support the integration of dietary recommendations for more plant-based, sugar-reduced diets etc. into individual everyday routines. Depending on the institution providing the advice, the effect can potentially be reinforced by social norms (e.g. through integration into general practitioner consultations, dietary advice, programs for young families, etc.) (Quack et al., 2023).

6.2.3 Taxation and financial incentives

Financial incentives have an influence on supply and demand and can thus reduce the consumption of products containing sugar or animal products, for example, and promote the consumption of fruit and vegetables or plant-based products overall (Quack et al. 2023). The financial instruments include taxes, e.g. the meat taxation, the sugar tax, the withdrawal of the reduced VAT rate for animal products, the reduction of the VAT rate for fruit, vegetables and pulses to zero percent or the introduction of an excise tax on animal products, as proposed by the Competence Network for Livestock Farming in Germany.

An increasing body of literature explores the implications, effectiveness, and distributional impacts of implementing taxes as a strategy to address environmental concerns, particularly greenhouse gas emissions, and public health issues associated with animal protein consumption in general or meat consumption in specific. Several studies show that different food taxes (meat tax, sugar tax, tax on saturated fat, carbon-based tax on food, excise tax on animal products etc.) and subsidies (for fruit and vegetables, for climate etc.) have various effects. It has been shown that taxes and/or subsidies can reduce or increase consumption. In addition, health benefits have been demonstrated, with the sugar tax having the greatest benefit for health. And overall, taxes and/or subsidies can lead to significant societal benefits through lower health costs and environmental benefits such as the reduction of diet-related diseases and greenhouse gas emissions (Blakely et al., 2020; Broeks et al., 2020; Jensen et al., 2016; Säll & Gren, 2015; Springmann et al., 2018).

Overall, success of financial measures depends on careful design, implementation, and integration into broader strategies. Additionally, monitoring and evaluation are crucial to assess impact, adapt strategies, and ensure that the benefits of such taxes are maximized while minimizing any negative effects. There is also a need for tax concepts that consider the impact on vulnerable demographic groups (Roosen et al., 2022).

Financial incentives also include support programs (Wunder & Jägle, 2022). Germany, for example, is investing 38 million EUR in the sustainable protein transition from 2024 onwards using funds from the federal budget. The measures adopted include both transformation aid for farmers and the establishment of a "Proteins of the Future" center. First, a roadmap for the protein transition is to be drawn up that defines measurable targets and identifies activities from policy and economy.

Denmark, for example, will invest the equivalent of 1 billion kroner (168 million EUR) in the plant-based sector and has published a national action plan, the "Danish Action Plan for Plant-based Foods". Countries such as France and the UK are also investing in the plant-based sector.

6.2.4 Shaping the food environment to make the sustainable choice the easy choice in out-of-home catering

Out-of-home catering (OHC) can effectively shape food environments as it represents an area of food consumption that has been growing for years. Ensuring a more sustainable supply within this sector is crucial for driving the transformation of the food system, especially because public consumption helps shape standards and perceptions of what is considered normal. State actors hold direct influence over this market, particularly in communal OHC for public authorities and institutions such as schools and hospitals. This influence extends through the establishment of procurement guidelines, legal regulations, advisory services, and standards. Furthermore, the communal catering sector can play a pivotal role in fostering the development of bio-regional and plant-based value chains (Hanke et al., 2023).

Both **communal and individual catering sectors** offer avenues for substantial change toward healthier, more environmentally friendly diets. **Communal out of home catering (COHC)**, which includes meals provided in kindergartens, schools hospitals, or in companies, in Germany for instance reaches an estimated 16 million guests per day. **Individual out of home catering (IOHC)**, on the other hand, for example, includes restaurants, cafes, bakeries, or catering services at events. Implementing changes in these settings requires careful consideration of various factors to ensure the interventions are effective, accepted, and sustainable over time.

For both, **communal and individual OHC** it is important:

- to change perceptions and encourage acceptance of new, sustainable menu options. For instance, highlighting the taste, health benefits, and environmental advantages can help make these options more attractive,
- to provide adequate infrastructure for preparing and serving sustainable dishes and training for kitchen and service staff are necessary to ensure high-quality offerings,
- to engage all stakeholders, including food service providers, kitchen staff, and the end consumers (e.g., students, patients, employees) as to understand their preferences, constraints, and capacities to inform more effective and acceptable interventions, and
- to implement a system for monitoring and evaluating the impact of these interventions and to allow for adjustments over time to ensure effectiveness.

Communal OHC – with advisory programs and dietary guidelines

The various actions that public authorities and policymakers can take to facilitate change in communal out of home catering are illustrated in the case of the city of Copenhagen (see below for more details). A similar model has also been adopted in Berlin with the so-called "Kantine Zukunft". It is an advisory program for communal OHC in currently three federal states in Germany (Berlin, Brandenburg, and Saxony). The goal is to provide 1:1 advice directly in kitchen settings, enhancing the competencies of those involved in the communal OHC (including those in schools, daycare centers, public institutions, and eventually hospitals) and assisting them in transitioning towards offering more plant-based, organic, fresh, and tasty meals. This transition is aimed to be largely cost-neutral and feasible within existing budget constraints (Hanke et al., 2023).

A further approach is the introduction and implementation of mandatory dietary guidelines for communal catering. Germany, for example, has developed the so-called DGE quality standards[1] for different communal OHC facilities (schools, daycare centers, clinics, businesses, senior citizens' facilities), but these are not yet mandatory.

1 DGE quality standards: https://www.dge.de/presse/meldungen/2021/aktualisierte-dge-qualitaetsstandards/

Individual OHC – voluntary commitments, guidelines, and certification for restaurants

For the individual choices made in restaurants, bakeries or in public events, policymakers can work with voluntary commitments, or include guidelines example for the organization of (public) events, as has already been agreed in Germany for the federal government as part of the package of measures of the German Sustainability Strategy (Quack et al., 2023; The Federal Government, 2020). Although such voluntary commitments from individual catering establishments can lead to change, their effectiveness can vary widely.

An important influencing factor to shape consumer choices is the availability of certification to increase awareness and guide choices in out of home catering. The example of the Danish Organic Cuisine Label for restaurants demonstrates the effectiveness of this pragmatic approach for organic certification of restaurants. Germany has also recently introduced a similar approach via a three-level organic label for restaurants, canteens and cafeterias. In Estonia, new rules and label for organic catering was introduced in 2017, with the three stages set at 20-50%, 50-80%

Box 5

Danish organic cuisine label for restaurants

In 2009, the Ministry of Food, Agriculture, and Fisheries initiated a program to endorse the use of organic food in extensive kitchen operations, including restaurants, cafés, hospitals, educational institutions, and sizable enterprises. By ten years after its inception, the Organic Cuisine Label had been adopted by over 3,250 eateries.

The Danish organic label for restaurants, also known as the "Ø-label" or "Organic Cuisine Label," is a certification system designed to promote organic food and sustainable practices in the foodservice industry. This label is part of Denmark's broader effort to support organic farming and increase the consumption of organic products. The label is recognizable by its red Ø logo, which is the same used for organic food products in Denmark, but with additional elements to indicate its application to restaurants, cafes, and other foodservice establishments.

The Danish organic label for restaurants is awarded based on the percentage of organic ingredients used in the total food purchase by the establishment. It operates on a tiered system, allowing for different levels of certification depending on the proportion of organic ingredients used:

- **Bronze:** For restaurants where 30-60% of all food and beverages (excluding water and wild living ingredients) are organic.
- **Silver:** For establishments where 60-90% of all ingredients are organic.
- **Gold:** For those achieving 90-100% organic ingredients in their offerings.

90-100% organic 60-90% organic 30-60% organic

The certification process involves an application to an authorized certification body, followed by documentation and audits to ensure compliance with the standards set for organic food sourcing and handling. This includes not only the percentage of organic ingredients used but also considerations for environmental impact, animal welfare, and reduction of food waste.

Restaurants that earn the Danish organic label are permitted to display the Ø-label with the corresponding bronze, silver, or gold designation, signaling to customers their commitment to organic ingredients and sustainable practices. This system encourages restaurants to increase their use of organic products and provides transparency to consumers looking to make environmentally friendly dining choices.

6.2.5 Tools for reducing food waste

Efforts to reduce food waste are often seen as the most agreed upon and accepted strategy for improving sustainability. This involves changes at all levels of the food supply chain, from production and processing to distribution, retail, and consumption. Therefore, an integrated, holistic approach across every stage of the food supply chain (including food redistribution) is needed to tackle food waste.

This includes both actions by public and private stakeholders. Important cross-cutting actions are the following:

- Develop a roadmap/action plan or national strategies to prevent and reduce food loss and waste. For example, the Netherlands, France and Germany, have developed national food waste prevention strategies and established governance structures bringing together all stakeholders.
- Integrate food waste reduction in relevant national strategies and programmes (food strategies, climate action strategies and programmes).
- Enhance the accessibility and accuracy of data regarding food loss and waste levels, along with their associated social, economic, and environmental impacts.
- Improve evaluation, monitoring and sharing success factors and best practices from interventions that aimed to reduce food waste.

At the primary production level improving resource efficiency, a better matching supply with demand, further research on marketing standards or supporting sustainable, short value chains are key actions to prevent and reduce food loss and waste. At the manufacturing stage it is crucial to collaborate with the other stages of the food supply chain. Key opportunities in reducing food waste within this sector include enhancing processing methods, exploring innovative packaging solutions, providing various portion sizes, educating consumers on date labeling, facilitating the redistribution of surplus food and fostering circularity across feed and food.

Key areas for improvement in reducing food waste within the retail sector include bolstering support for upstream suppliers, enhancing logistics and stock management in stores, and raising consumer awareness about the issue. Retailers often spearhead sustainability initiatives through voluntary actions, whether at the company or global level, as seen in agreements like the 2012 Retail Agreement on Waste (REAP) and the Food Waste Resolution of the Consumer Goods Forum. These initiatives commit leading food companies and retailers to halving the amount of food wasted within their companies by 2025. Additionally, co-operative retailers play a significant role in food waste reduction through various measures, including extensive educational campaigns aligned with cooperative principles and values.

The food service sector is very heterogeneous, encompassing various sub-sectors such as hotels, restaurants, contract catering, and event catering, each varying in size, structure, and services offered. Efforts in this sector can concentrate on closing the knowledge divide on food waste by creating comprehensive guidance, leveraging partnerships with third parties to expand knowledge, and involving both businesses and customers in initiatives aimed at waste reduction.

At the consumer level reducing food waste requires interventions that affect food environments as private households are influenced by other sectors' actions. Strategies to shape consumer behavior encompass diverse approaches such as social norm campaigns, skill-building initiatives to avoid or reduce food waste, feedback mechanisms, prompts, personal commitments, or nudging (Timmermans, Wunder & van Herpen, 2020).

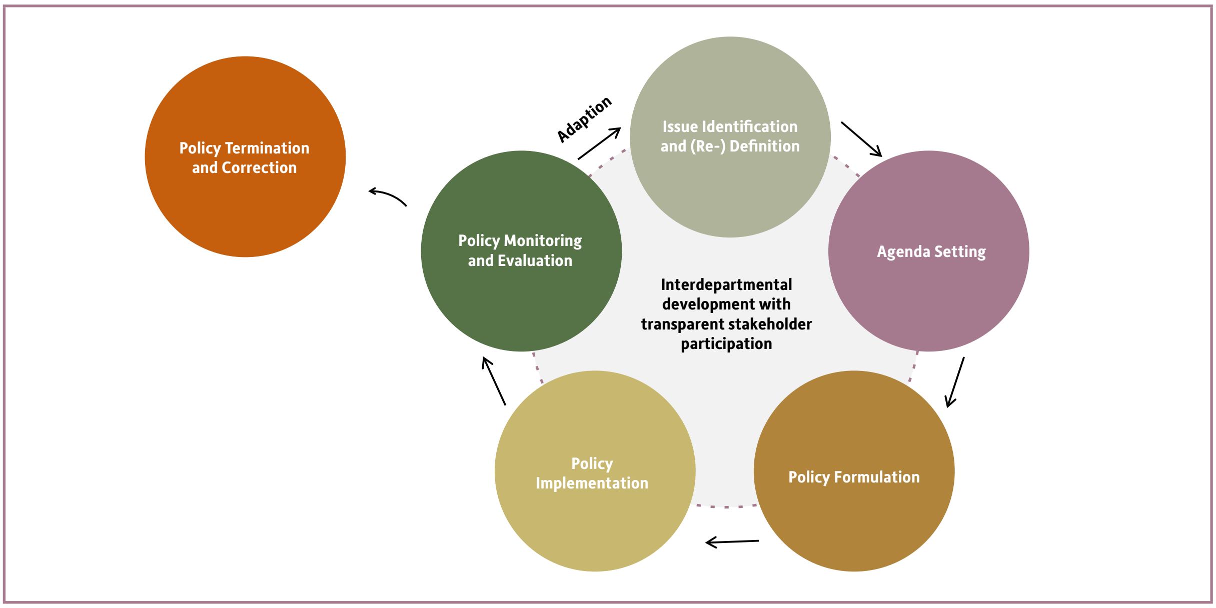
6.3 Towards holistic food strategies

Municipal, regional, and national food strategies can facilitate a food system approach, drawing on the range of possible policy instruments outlined above, as they allow the possibility to integrate several sectoral policies and increase coherence. There are various examples of food strategies in the EU, both at national and regional level that can provide inspiration both for how to organize the process and for defining the content of the strategies. It is also possible to start with the low-threshold introduction of individual instruments, and then build on these. For example, public authorities can start with a more contained action plan, focused on one specific aspect, such as organic food in public canteens, or with funding lighthouse or pilot projects. This can provide a proof of concept and increase the buy-in and sensibilization of stakeholders to a more integrated approach. However, to speed up the transition and coordinate activities more effectively, the introduction of a food strategy, in which targets are set and specific measures to reach these targets are defined, is a more promising approach. Moreover, by defining indicators, the achievement of objectives can be made measurable.

6.3.1 First steps towards a food strategy

According to the policy cycle (Figure25) there are several steps to develop a food strategy.

Figure 25: Policy cycle for the development and implementation of a food strategy



Source: Wunder & Jägle, 2022

1. Problem definition: Identify stakeholder, define key issues

The starting point of the process of developing a food strategy is in addition to identifying the relevant stakeholders to be involved, the need to establish a common understanding of the key issues that the strategy should address. This requires conducting a data analysis to identify the key issues in the country or region. For example, the key issues could be meat consumption, health issues, food waste, or others. Furthermore, data must be processed in a way that is easily understandable and highlights potential course of action. The stakeholder involvement is important in all phases and should be well planned at the very beginning.

2. Agenda setting: Select strategic objectives and impact areas

In the next step all relevant actors should be included, and a very good facilitation of the process ena-bled. The strategic objectives and areas of impact should be defined together with all actors. (Be aware: Either one can start an open process in which objectives can be developed completely freely, thereby raising high expectations among stakeholders that possibly can't be met, OR there are already ideas of the implementing party such as the ministry for strategic objectives and the process is managed and moderated accordingly by focusing and working on these objectives that can also be implemented by the ministry).

3. Policy formulation: Set measures and indicators

One problem with the organization of many dialogues and strategy processes is that they often remain at the level of setting objectives and building a vision, failing to move into the essential step of setting measures that can be implemented. Focusing on key impact areas and developing targeted measures and responsibilities is crucial for the impact of a strategy. To measure effects, progress and to adjust the strategy, if objectives are not met, measurable indicators should be developed.

4. Implementation: Implement measures, develop action plans, include pilot projects, provide funding

The specification and implementation of measures must be at the core of developing a food strategy, with the provision of a dedicated budget for implementing measures being crucial. Additionally, stakeholders involved in implementing their own measures should be supported. In the case of the UK Food Strategy, it has proven useful to test the acceptance of certain policy proposals in focus groups and to utilize an impact analysis, which, in addition to outlining the measure and clarifying the exact responsibilities, estimates the necessary costs for implementing the measure.
It is also recommended to start with action plans and include lighthouse projects for example for the public procurement as there's the possibility to and the one hand shape dietary patterns, preferences or social norms to a large extent and on the other hand has influence on value chains by demanding large scale of products (e. g. House of Food, or Kantine Zukunft). Lighthouse projects can provide feedback as to whether something is working.

5. Evaluation: Evaluate policies and measures/impact assessment

Integrated food policies are a new policy area, so that very little is known about the impact of the interventions. Therefore, it is important to set up an evaluation early in the process.

6. Re-definition: Adjust or terminate policies if needed

After evaluating measures, you can learn from what works and what does not work. Measures can be continued, adjusted, or terminated. This policy cycle continues until the strategic goals are achieved.

6.3.2 Success factors for planning the process of developing a food strategy

There are several general success factors that should be considered while planning and designing the process of developing a food strategy (see Wunder and Jägle, 2022).

1. Bundling processes as part of the creation of a food strategy

The development of a national food strategy offers the opportunity to bundle various discourses and processes on the future of food policy. This helps to exploit synergies, reduce conflicts of objectives, and meaningfully integrate the capacities of the actors involved. Countries can build on various processes, which are currently taking place on the future food policies.

At global level: The 2023 UN Food Systems Stocktaking Moment as the first global follow-up to the 2021 Food Systems Summit. During this event individuals and countries committed to accelerate and deepen the transformative power of food systems to achieve all 17 SDGs. At this high-level gathering countries can report on progress made at the national level and on their contributions to the achievement of the 2030 Agenda for Sustainable Development

At the EU level: In connection with the implementation of the EU Farm to Fork Strategy, a legal framework for sustainable food systems (SFS-Law) had been envisioned but was later withdrawn. This process could be picked up again following the European Parliament elections in June 2024.

At national and regional level: Several countries have been updating their food based dietary guidelines, and the food strategy development could be built on the experiences and actor networks attached to this process.

There are also various bottom-up initiatives emerging in Central Eastern Europe, from action plans around organic foods in cities (e.g. Croatian capital Zagreb has set the goal of increasing organic food in schools), to food waste initiatives and campaigns on healthy nutrition. At national level, countries might also already have some ongoing coordination efforts around different activities on food. If these are only focused on human health aspects, they can be expanded in scope to also consider climate and environmental sustainability aspects of food consumption.

In some countries, **research projects** may also provide a starting point to support a more integrated approach, as they offer additional resources and can coordinate and introduce new approaches. For example, the EU project VISIONARY – Food Provision through Sustainable Farming Systems and Value Chains takes on a systems' perspective and includes three CEE countries (PL, RO, HU). European funding via various instruments can be used to support lighthouse and enabling research, to address limited public funding available or other barriers within the system.

2. Selection of the actors involved

For the development of a strategy, the involvement of relevant actors in the food system and the integration of their different perspectives, arguments, and experiences is essential. Therefore, at the beginning of the process, an analysis of the actors is necessary, followed by a transparent selection to include relevant professional groups, scientists, and civil society organizations.
In recent times, collaboration with actors in the field of medicine and health has proven particularly beneficial. Additionally, given the rising inflation and food poverty, it is crucial to involve representatives of societal groups most negatively affected by current developments in the food system. Recommendations from citizens' councils, as seen recently in Germany demonstrate the importance of incorporating the voices of citizens from diverse social backgrounds to assess the acceptability of measures in advance. Finally, based on the experiences of the UK Food Strategy, it is essential to continually consult with parliamentarians from all parties during the development process to ensure sufficient political support for the ideas' content from the outset and to incorporate the arguments of parliamentarians. Various methods can be used for their involvement, such as plenary discussions, working groups, the involvement of an (international) advisory board, and focus groups on specific policy proposals following the model of the UK strategy.

3. Formats and process design

Food policy encompasses numerous topics and is a relatively new policy field, meaning that various stakeholders come together who often have not previously known each other. Therefore, there must be enough space to allow individuals, arguments, and positions to be known. For event organization, this means allowing sufficient time for discussion and providing various avenues for formal and informal exchanges. To shape the participatory process well, it is crucial to find suitable formats to which stakeholders are invited well in advance. Additionally, it is important to note that for non-profit organizations, due to limited personnel and financial resources, it is more challenging to participate in time-intensive processes compared to stakeholders in the food industry and governmental institutions. Hence, effective coordination of the different processes becomes even more important (see point Nr 1.).

4. Integrated approach and cross-departmental development

The transformation of food systems and the associated major challenges require a systemic approach that considers all topics and fields of action relevant to food, such as climate, animal welfare, health, environment, social affairs, etc.

In order to integrate these different topics, it is important to promote the cross-departmental development of the strategy by involving all the departments that are affected by sustainable food policy in their work and/or should help shape it (e.g. food and agriculture, health, environment and consumer protection, economy and climate protection, finance, labor and social affairs, family, education and research, economic cooperation and development.

Experience with the Swedish and English strategies, as well as the Lower Saxony and Berlin strategies, has shown that it makes sense to involve and support the highest possible (political) level to achieve ambitious political implementation.

5. process support moderation and coordination office

The moderation and process design are important prerequisites for successful content design of a food strategy and should not be underestimated. This requires people who are committed and can support the negotiation of compromises across all interest groups. These people should enjoy the trust of all those involved, as they can help to build mutual understanding. An outwardly visible person who represents this was in the case of the UK Food Strategy (Henry Dimbleby) and in the case of the Future Commission for Agriculture in Germany and now for the currently initiated Strategic Dialogue on the Future of Agriculture (Prof. Dr. Strohschneider), although here too the commitment of a dedicated team was behind the negotiation of the compromises. Due to the expected coordination effort in addressing the stakeholders and developing texts, the establishment of a coordination office from the outset is valuable. To facilitate an interdepartmental negotiation process, it may be advisable to assign the coordination of this task to a higher-level body, for example the office for the prime minister or chancellor's office. The coordination of the process by a downstream agency of the ministries is also a possibility, as these have the necessary expertise and existing networks with relevant stakeholders. In addition, support from professional process designers can be beneficial. This option was used in Germany, for example, when designing the Berlin Food Strategy and the Brandenburg Food Strategy.

6.3.3 Learning from others: examples of existing approaches

The development of food strategies is crucial for the implementation of the above-mentioned policy approaches and instruments, but the wheel does not have to be reinvented. There are already various examples of food strategies in Europe from which success factors can be derived in terms of processes, content, and specific recommendations.

Some of the most well-known examples, from national, federal state and city level include:

- Germany: Food Strategy of the Federal Government "Good food for Germany"
- England: National Food Strategy
- Belgium, Gent: "Gent en Garde Food Policy"
- Denmark, Copenhagen: "The City of Copenhagen's Food Strategy"
- Germany, Baden-Württemberg: "Food Strategy Baden-Württemberg"
- Germany, Berlin: "Food Strategy Berlin eats well and healthily!"
- Germany, Hessen: The Hessian Food Strategy „Eating well in Hessen: healthy, regional, sustainable"
- Germany, Lower Saxony: "Our recipe for the future! Lower Saxony's Food Strategy"
- Germany Brandenburg: Food Strategy Brandenburg

The example of the English food strategy provides valuable insights into how the process can be organized, and the German and Gent strategies show good approaches for defining strategic goals and measures. The example of the City of Copenhagen, which has developed a holistic approach, is presented in more detail below as it is a particularly successful example that can offer valuable inspiration.

City of Copenhagen

Denmark's capital Copenhagen is renowned for its commitment to sustainability and promoting organic and environmentally friendly practices and lifestyles. This commitment is driven by a desire to improve public health, reduce environmental impact, and set a standard for sustainable living.

The city spends approximately 43 million EUR annually on food procurement, producing 70.000 meals daily across 1000 kitchens with the help of 1.700 employees. These meals are distributed across various institutions, including daycares, schools, nursing homes, and staff canteens. The core of Copenhagen's strategy lies in its high political ambition, aligned with the Sustainable Development Goals (SDGs). This ambition translates into tangible actions such as achieving 90% organic food procurement, reducing food waste, emphasizing seasonality and diversity, ensuring climate-friendly food, and implementing green practices in transportation and packaging.

The food and meal policies in Copenhagen have been politically driven since the early 2000s, with an initial goal of 75% organic procurement. This target was later increased to 90%. Since 2016, there's been a policy for every institution to achieve at least a silver certification in the national 'Organic Food Label' scheme. In 2019, a cohesive policy was adopted, mandating that all institutions offering food must have a gold certification in the Organic Food Label and achieve a 25% reduction in climate impact.

Areas of action

Several different areas of action have been pursued by Copenhagen food and meal policies:

Food Schools: In Copenhagen, food schools emphasize incorporating nutritional education into their curriculum. They aim to create a physical and social environment conducive to education, learning, and culture in the context of sustainable food production and consumption. The schools offer kitchen apprenticeships, where students participate in food production and meals for one week each year. The kitchen serves as a practical learning space, aligning education with everyday life skills and contributing to food literacy. The concept of Food Schools is driven by the recognition of food's impact on children's physical, social, and mental health and can also mitigate health inequality issues. Currently, there are 17 Food Schools in Copenhagen, with plans to increase to 24 by 2025 and 30 by 2032. These schools serve about 6.000 meals daily, with around 65% of children participating monthly. Families with low incomes benefit from reduced prices, and the city allocates 54 million kr. annually for school food.

Hospitals: The largest emergency treatment facility in Denmark is a prime example of sustainable food practices in healthcare. It emphasizes patient empowerment, quality food service, precise individual nutrition, reduced food waste, and a digital menu system. Producing 6.000 meals per day, the kitchen staff includes various nutrition and culinary specialists, focusing on sustainable food production tailored to patient needs. The hospital addresses a wide range of patient needs beyond health necessities, including dietary preferences, allergies, and religious beliefs. The digital menu allows patients, relatives, and staff to order meals, integrated with the hospital's main data system. It features a nutrition barometer with personal dietary recommendations and a meal diary for tracking intake. Customer feedback has been very positive, and the hospital has achieved significant cost and CO_2 emission reductions so far.

Hotels and Restaurants: The sustainability model extends to Copenhagen's hospitality industry. Hotels and restaurants are increasingly adopting practices like sourcing local and organic ingredients, reducing food waste, and focusing on seasonal menus. For instance, one large and popular hotel chain has a restaurant that only utilizes organic and locally sourced ingredients, along with alternative proteins – besides goals with respect to reduced energy consumption, CO_2 emissions and food waste and an increased usage of eco-labeled cleaning products.

Consultancy: One food and meal consultancy in Copenhagen plays a pivotal role in guiding institutions toward sustainable practices. Their approach includes counseling programs, providing climate-friendly recipes, and promoting organic food purchasing within existing budgets. The consultancy focuses on providing 70.000 meals a day across over 1000 institutions, including daycares, schools, elderly homes, and social institutions.

Staff training/Education: Culinary education in Copenhagen integrates sustainable practices into its curriculum. Chef training programs and other hospitality courses increasingly focus on organic cooking, sustainable procurement, and environmental consciousness, preparing the next generation of chefs and hospitality professionals to uphold and advance these principles.

From Copenhagen's approach, several **key learnings** can be derived:

1. Holistic Strategy: The integration of sustainability into every aspect of food procurement, from schools to hospitals to the hospitality industry, demonstrates the effectiveness of a holistic strategy.
2. Political Will and Public Support: The success in Copenhagen shows the importance of strong political will and public support in driving sustainable practices.
3. Education and Training: Incorporating sustainability into educational programs such as schools and staff training ensures that future generations continue to uphold and innovate in these practices and create a "new normal".

6.4 Conclusions

In this chapter, we underlined the need to further develop and integrate policies for sustainable food consumption. The starting point for this needs to be a shift in perspective from the singular emphasis on individual responsibility to the role that food environments play in determining food consumption. This reframing puts in focus a range of instruments and tools that policymakers have for promoting sustainable food consumption, both via educating and informing consumers and actively shaping the decision environment. Policymakers can use various tools to affect the socio-cultural, physical and economic contexts within which individuals make choices about foods. These include campaigns, food advertising, marketing activities, educational and advisory services, taxation and financial incentives, as well as various ways to nudge sustainable choices in out of home catering and in reducing food waste.

To ensure sufficient ambition and coherence in the policy design, it is important that various policy tools are coordinated, and progress is monitored. Municipal, regional, and national food strategies play an important role in this and can facilitate a systems approach. Numerous examples of food strategies from the EU to national and regional level can offer for how to organize the process and for defining the content of the strategies, including targets and specific measures to reach these targets. Depending on the starting point, policymakers can also start with developing and building on individual instruments, from actions plans focused on single aspects, such as organic food in public canteens, or lighthouse and pilot projects.

Regardless of the level at which the strategic approach is pursued, it is important to build on existing processes, involve the range of relevant actors, and pay attention to format and process design, as well as sufficient cross-sectoral and cross-departmental coordination. It is also important, that food consumption policies are integrated with agricultural, environmental and climate policies.

7 Conclusions

To drive the sustainability transition in the agri-food systems, agroecological practices and nature-based solutions along with sustainable diets need to become the cornerstone of the agriculture, climate and food agendas and these agendas need to pursue a synergistic and coordinated approach.

The analysis presented in this report shows that both the CSP plans and the NECPs do not yet prioritize mitigation goals in the agri-food sector and the extent to which mitigation goals are integrated they do not focus on agroecological practices, other nature-based solutions, and sustainable food consumption. We have shown how these could CAP and NECPs could be improved, and we have also shown how countries can make progress of sustainable food consumption policies.

In addition to knowing where the leverage points for change are, it is also important to note that by themselves this is not enough. To speed up the development of the required policies for transition, several streams of actions are needed (adapted from Runhaar, 2021):

1. **Increase awareness** of what the key elements of the sustainability transition are: how we produce food, dietary changes, and reduced food waste. A useful resource in this context is the webinar series "Climate Action in Agri-food Systems in Central Eastern Europe".
2. **Develop proof of concepts** in different countries and regions that will demonstrate the benefits of the sustainability transition for farmers and wider society.
3. **Define clear and simple goals** that can be easily recognised and broadly accepted, such as concrete goals for peatland rewetting, the establishment of new agroforestry systems, areas utilised for organic farming, consumption of organic foods in schools, production of plant-based foods, ambitious animal welfare with outdoor access and grazing.
4. Build **sufficient political and societal pressure** around these goals.
5. Develop **a broad coalition of societal actors** working together to push for setting up and implementing these concrete goals.
6. **Increase institutional capacities** to support and sustain the transition. While the top-down tools and targets can provide an impetus, bottom-up capacity building is needed to implement these targets through effective and well-designed measures in the CSPs and NECPs as well as in food policy. Efforts and resources are needed to build the capacity of researchers and officials to support decision-making and societal dialogue on how to implement the transition in specific contexts. European research programmes can support this. Exchanging experiences between countries that are more advanced and those that are just starting out with the integrated approach can also be very effective. This can include targeted technical assistance, such as was made available via the Twinning projects during the pre-accession phase and can support public administrations.
7. **Improve cross-sectoral policy coordination**. For example, the demand-side for sustainable food consumption should be reflected in the NECPs and the CAP, and integration between these policies and broader food policies should be set up. This in turn requires better cross-sectoral coordination at ministry level, across ministries which cover agriculture, food, health, and climate policies, and other public agencies. Setting up a coordination unit for sustainable agri-food systems, with a concrete mandate and funding available for their work, can facilitate coordination.

These conditions build on and reinforce each other and can ultimately facilitate the wider transition towards climate friendly and resilient agri-food systems in CEE countries.

8 References & Annexes

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Annex 1: List of National CAP Strategic Plans

EU Code	Title	Used Version & Date Published	Link
BG	BG - СТРАТЕГИЧЕСКИ ПЛАН ЗА РАЗВИТИЕ НА ЗЕМЕДЕЛИЕТО И СЕЛСКИТЕ РАЙОНИ НА РЕПУБЛИКА БЪЛГАРИЯ ЗА ПЕРИОДА 2023-2027 г. EN – Strategic plan	1.2 22/11/2022	https://www.mzh.government.bg/media/filer_public/2023/01/10/strategicheski_plan_2023-2027_8LjLWGr.pdf
CZ	CS - Strategický plán SZP na období 2023-2027 EN - CAP Strategic Plan for the period 2023-2027	1.3 24/11/2022	https://eagri.cz/public/portal/-a31876---TvBUcDz6/strategicky-plan-spolecne-zemedelske-politiky-ceske-republiky-na-obdobi-2023-2027-schvalene-zneni-verze-1.3?_linka=a537292
EE	ET - Ühise põllumajanduspoliitika strateegiakava 2023–2027 EN - Common Agricultural Policy Strategic Plan 2023–2027	1.2 21/10/2022	https://www.agri.ee/sites/default/files/documents/2022-10/%C3%BCpp-2023-tervikteskst-2022-10-21.pdf
HR	HR - Strateški plan Zajedničke poljoprivredne politike Republike Hrvatske 2023. - 2027. EN - Strategic Plan of the Common Agricultural Policy of the Republic of Croatia 2023 - 2027	1.2 7/10/2022	https://ruralnirazvoj.hr/files/sfc2021-2023HR06633844590798650 37.pdf
HU	HU - Magyarország KAP stratégiai terve, 2023-2027 EN - CAP Strategic Plan Hungary, 2023-2027	1.2 20/10/2022	https://kormany.hu/publicapi/document-library/magyarorszag-kap-strategiai-terve-2023-2027/download
LT	LT - Lietuvos žemės ūkio ir kaimo plėtros 2023–2027 m. strateginis planas Strategic plan 2023–2027 for Agriculture and Rural Development of Lithuania	1.1 23/11/2022	https://zum.lrv.lt/uploads/zum/documents/files/LT_versija/Veiklos_sritys/Bendroji_zemes_ukio_politika/PATVIRTINTAS_LT%20strateginis%20planas_2022_11_21.pdf
LV	LV - KLP stratēģiskais plāns EN - CAP Strategic plan	1.2 21/10/2022	https://rural-interfaces.eu/wp-content/uploads/2020/04/Latvian-CAP-Strategic-Plan.pdf
PL	PL - Plan Strategiczny dla Wspólnej Polityki Rolnej na lata 2023-2027 EN - CAP Strategic Plan 2023-2027	1.1 15/07/2022	https://www.gov.pl/web/rolnictwo/plan-strategiczny-dla-wspolnej-polityki-rolnej-na-lata-2023-27
RO	RO - Planul PAC 2023-2027 pentru România EN - CAP plan 2023-2027 for Romania	1.2 22/11/2022	https://www.madr.ro/docs/dezvoltare-rurala/2022/PNS_2023-2027-versiunea_1.2-21.11.2022.pdf
SI	SL - Strateški načrt skupne kmetijske politike 2023–2027 za Slovenijo EN - Common Agricultural Policy Strategic Plan 2023–2027 for Slovenia	1.1 29/09/2022	https://skp.si/skupna-kmetijska-politika-2023-2027/arhiv-sn-skp
SK	SK - SK EN - CAP Strategic Plan 2023-2027 - SLOVAKIA	1.2 30/11/2022	https://www.mpsr.sk/download.php?fID=23121

Annex 2: Land use mitigation measures

MM1: Conversion of arable land to grassland to sequester carbon in the soil
MM2: Grassland management to enhance C sequestration
MM3: New agroforestry
MM4: Afforestation / avoiding deforestation
MM5: Woodland and forestry management
MM6: Hedgerows and woody field margins
MM7: Peatland/wetland maintenance and conservation
MM8: Peatland/wetland restoration
MM9: Lowland peatland/wetland appropriate use

Cultivation practices on arable land (zero tillage & minimum tillage)

MM10a: Zero tillage
MM10b: Minimum tillage

Soil organic carbon and soil fertility improvement

MM11a: Retention of crop residues on fields
MM11b: Mulching, ridge and furrow
MM11c: Appropriate timing of field operations to avoid soil compaction
MM12: Improved Rice Cultivation (Alternate Wet and Dry Techniques)
MM13: Crop breeding for varieties that use N more efficiently
MM14: More diverse and longer crop rotations
MM14a: Rotations with perennial forage crops
MM14b: Land fallowing of arable cropland

Catch/cover crops

MM14d: Legumes in a crop rotation and increased legume share in grass mixes
MM15: Intercropping/ crop consociation
Measures for nutrient management
MM16a: Optimal pH for nutrient uptake in arable and improved grass
MM16b: Urease inhibitors coupled to mineral N fertilisers
MM16c: Nitrification inhibitors with mineral N fertilisers and manure
MM16d: Organic production approaches - no synthetic N
MM16e: Slow and controlled release nitrogen fertiliser and organic-mineral fertilisers
MM16f: Testing, planning and advice to avoid excess application of N fertiliser
MM16g: Precision farming coupled to fertiliser placement (variable rate distribution)

Manure applications

MM17a: Slurry application by trailing shoe
MM17b: Slurry application by dribble bar (trailing hose)
MM17c: Slurry application by injection
MM17d: Incorporation of slurry and solid manures within four hours of application

Manure storage

MM18a: Cooling slurry
MM18b: Slurry acidification
MM18c: Covering manure and slurry stores
MM19: Biogas production from manures (substitution effect of fossil based energy)
MM20: Livestock Density Limits

Livestock health

MM21a: Herd fertility
MM21b: Reduction in endemic disease

Livestock feeding

MM22a: Feed additives for ruminant diets
MM22b: Optimised feed strategies
MM22c: Optimised forage/grazed crop utilisation
MM23: Breeding lower emissions animals

Renewable energy

MM24a: Production of biogas using biomass originating from agriculture and forestry, such as manure, crop residues, ligno-cellulosic materials, etc. (substitution effect with fossil-based energy)
MM24b: Solar and wind energy production on farmland (substitution effect with fossil based energy)
MM24c: Production of energy (electricity, heat) using woody biomass originating from agriculture and forestry, such as perennial woody and herbaceous biomass crops (SRC, miscanthus, switchgrass, common reeds, cardoon, etc.), crop residues, etc.
MM24d: Production of biofuels/advanced biofuels using biomass originating from agriculture and forestry (substitution effect with fossil fuels, especially in the transport sector)
MM24e: Production of materials using biomass from agriculture and forestry, such as woody biomass or crop derived products (e.g. straw) (substitution effect with fossil based materials)
MM25: Energy Efficiency
MM26: GHG emissions assessment and eco design