Incentives for Climate Change Mitigation across the Agri-food Value Chain

Workshop 4 - Cohesion

Section 1: Introduction

The theme of this paper and its corresponding technical workshop is “cohesion.” The aim is to discuss the potential social impacts of the market-based policy options under discussion for the study. At the workshop, participants will be encouraged to explore together solutions to minimise negative impacts and maximise positive ones. The focus on cohesion will be on the implications of the policy options for the social fabric and well-being of EU inhabitants.

Cohesion policies were introduced at the EU level in the early 1990s to ensure equitable participation in growth and prosperity across Europe, as economic efficiency was not necessarily benefitting all regions of Europe equally, and policies to increase efficiencies risked further concentration of economic activity in a few urban regions, leaving many places on the periphery behind (Jouen, 2017). The goal of cohesion policies was to create a level playing field by addressing regional disparities in economic development, structures, and geographic conditions. Cohesion policies thus attempt to balance any disconnect between efficiency and equity and seek to facilitate shared prosperity in all regions. The aim is to support EU regions in establishing equal opportunities for individuals and businesses and foster comparable living standards across the EU.

Within this paper, we will examine the potential disparate effects of different policy designs on small farms and businesses, rural areas, and the health of EU inhabitants. The focus on such disparate effects will be shaped around discussions of the potential divergence or convergence between Member States of various social impacts. Overall, during the workshop, discussions around the 5 potential policy options should be on design options for avoiding asymmetric impacts that could fuel social exclusion.

Smallholder farmers and small businesses in the food sector are likely to have limited access to the resources and financing needed to comply with climate policy requirements. They face various challenges, which may be further exacerbated in less developed regions and Member States where additional compounding factors are at play. To identify where these impacts may be concentrated, this paper provides an overview of the agricultural and food industry structures across different EU Member States, with a focus on the prevalence of small enterprises. It explores potential policy measures to mitigate the effects in regions where more vulnerable or less adaptable small businesses are common, and where the challenges faced by these enterprises could have broader social consequences.

Traditionally, there is an observable urban-rural divide across the EU in terms of economic prosperity, including employment and income (Eurofound, 2023). While rural poverty rates and GDP rates are converging towards urban areas, there are still profound disparities across Member States. Structural factors, such as fragmented farming systems[1], limited industrialisation of farming sectors in some Member States[2], and low accessibility to urban areas and other amenities in more populated areas can exacerbate the urban-rural divide, although rural areas in close proximity to urban areas have reduced poverty and growth disparities. Unemployment rates in rural areas have declined significantly, though variations persist across regions, with youth unemployment remaining a concern. Rural employment has shifted away from agriculture in most regions, towards the services and industry sectors. While rural areas demonstrate positive trends in GDP and poverty reduction, they face significant demographic challenges, with declining populations due to youth migration to urban areas, an aging

[1] Wherein the farming sector is charaterised by a high number of small, family operated farms with limited land consolidation. This fragmentation can be traced back to historical, economic, and social developments, for example in countries such as Romania and Bulgaria, where farms were divided up into small plot sizes during the de-collectivisation processes in the post-communist era.

[2] The use of large-scale industrial equipment, such as combine harvesters, is often inefficient or impossible for farms which are fragmented into non-contiguous plots

population, and low birth rates, leading to reduced economic opportunities. The agricultural sector exemplifies this trend, with a third of EU farmers being above the age of 65; systemic barriers, including land availability and financial access continue to hinder young people's entry into farming.

The policy options may cause both positive and negative impacts across Member States. There could be improved opportunities for income diversification, thus improving the attractiveness of rural areas for younger generations. However, such opportunities may be dependent on access to capital as well as infrastructure for adopting lower-emissive practices and technologies. Smaller farms in poorer rural areas may find it difficult to participate in the market-based options due to investment barriers, which potentially could reinforce existing inequalities between rural areas in the EU. Carbon projects under the policy options could provide economic benefits for rural areas but could also lead to challenges such as land speculation. Potential means to decrease inequalities and increase cohesion are discussed in this paper.

The policy options under consideration could also have implications for the health and well-being of EU inhabitants through influencing shifting dietary choices. Climate policies could drive consumers toward plant-based diets and reduce intakes of saturated fat, which could have potential co-benefits for risks of and cardiovascular disease. However, localized impacts, socio-economic disparities, and varied substitution patterns pose challenges.

As a reminder to workshop participants, the policy options that will be assessed include:

1. Carbon Farming Procurement
2. Mandatory Climate Standard with a point of obligation for feed producers and/or food processors
3. Mandatory Climate Standard with a point of obligation for retailers
4. Agri-Food ETS with a point of obligation for feed producers and food processors
5. Agri-Food ETS with a point of obligation on-farm

Participants to this workshop are also being provided with a set of fiches providing an overview of the main design aspects for each of the policy options. The aim of these fiches is to provide participants with the requisite information for each of the options in a concise manner to facilitate discussions within the workshop, as well as to assist stakeholders with the completion of the worksheets provided to them.

Section 2: Impacts on small farms and small businesses in the food sector[3]

2.1: Smallholder presence and farm consolidation patterns across EU Member States

A key issue in assessing the structure of the agricultural sector across EU Member States, is determining what precisely constitutes a small farm. The characterization of agriculture within the EU is often rooted in the concept of family farming, with app. 93% of the 9.1 million EU farms classified as family farms, that is generally operating as family-run enterprises and typically passed down through generations (EC, 2023).

However, the interchangeable use of the terms "small farms" and "family farms" can be misleading. While small farms are generally family farms, not all family farms are small; rather, they encompass a wide spectrum of agricultural operations, ranging from small, semi-subsistence farms reliant solely on family labour to much larger farms that nevertheless remain predominantly managed by family members. This distinction between small and family farms should not be overlooked, in particular for policymaking purposes (EPRS, 2022). Notably, the term "family farm," denoting a legal or ownership structure, does not inherently determine factors such as commercial viability, investment capacity, or environmental impact.

[3] All quantitative data presented in this chapter, as well as data used as input into the charts presented in Annex I, is sourced from Eurostat, unless indicated otherwise.

Among the various metrics used to measure farm size – such as workforce, livestock numbers, or economic output – the most widely utilized within the EU is the extent of farmland. In the EU context, the advantage of this metric is the broad availability of data on farms' UAA – it is easier to obtain than other data e.g. providing measure of a farm's economic activity. Unlike jurisdictions such as the United States, where farm sales data is routinely collected, the EU does not currently gather comparable economic metrics (ibid.).

Consequently, this paper primarily focuses on physical measures, including acreage and livestock numbers, while acknowledging the limitations of these metrics in capturing the complexity of farming systems. As more comprehensive data on farm characteristics becomes available, the criteria for defining a small farm should be informed by a broader set of considerations and tailored to specific policy objectives.

Small farms across the EU as defined by the size of the utilised agricultural area

When examining the UAA managed by farms, **small farms make up the vast majority of agricultural holdings in the EU**. In 2020, 64% of farms in the EU had 5 hectares or less of UAA, while farms larger than 100 hectares represented only 4% of all agricultural holdings. Despite their predominance, small farms collectively manage only a small portion of EU agricultural land – farms with less than 5 hectares account for just 6% of the total UAA. In contrast, **large farms** exceeding 100 hectares control over half of the EU's UAA and, as a result, **are responsible for the majority of the EU's food and feed production**.

Table 1. Distribution of EU farms and Utilised Agricultural Area (UAA) according to farm size (%, 2020)

Size classes in hectares	**0 ha**	**< 2 ha**	**2 - 4.9 ha**	**5 - 9.9 ha**	**10 - 19.9 ha**	**20 - 29.9 ha**	**30 - 49.9 ha**	**50 - 99.9 ha**	**>100 ha**
EU UAA	0%	2%	4%	5%	7%	5%	9%	16%	52%
Share of all holdings in the EU	1%	41%	21%	12%	9%	4%	4%	4%	4%

Small farms, as a share of all national agricultural holdings, are most prevalent in southern and eastern EU regions. In most EU-14[4] countries, small holdings (defined as 5 ha or less) account for one-fifth or less of all agricultural holdings. The only EU-14 countries with significantly higher shares of small holdings (over 50%) are Mediterranean countries such as Spain (52%), Italy (64%), Portugal (73%), and Greece (74%) (see Fig. 1 in Annex I).

Among EU-13 countries, small farms of 5 ha or less make up more than 50% of all agricultural holdings in most cases. Only four countries in this group have a lower proportion of small farms relative to total agricultural holdings: Estonia (10%), Czechia (25%), Slovakia (40%), and Latvia (47%). In contrast, countries with particularly high shares of small holdings include Malta, Romania, Cyprus, and Croatia, where at least two-thirds of holdings are small.

Romania represents a unique case, with the highest overall number of farms in the EU at 2.6 million, of which nine out of ten are small. Most of these small farms consume more than half of their final production within the household (EPRS, 2022). The country with the next largest number of small farms is Italy, with 0.7 million. Other countries with a significant total number of small farms (over 100,000) include Mediterranean nations such as Italy, Spain, Greece, Portugal, and Croatia, as well as larger Central and Eastern European (CEE) countries like Poland and Hungary.

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[4] The paper employs the following classification of EU Member States for comparison purposes:
- 'New' Member States (EU-13): Bulgaria, Cyprus, Czechia, Estonia, Croatia, Hungary, Lithuania, Latvia, Malta, Poland, Romania, Slovenia, and Slovakia.
- 'Old' Member States (EU-14): Austria, Belgium, Denmark, Finland, France, Germany, Greece, Ireland, Italy, Luxembourg, Netherlands, Portugal, Spain, and Sweden.

An even more pronounced distinction between regions emerges when examining farms' economic size, as measured by standard output[5] (SO). **EU-13 countries exhibit a significantly higher proportion of farms generating a relatively low standard output** (below EUR 8,000) **compared to EU-14 countries**. In all but one EU-13 country (Czechia), more than half of the farms have a standard output below EUR 8,000. In the majority of EU-13 countries, over two-thirds of farms fall into this category, with Romania displaying the highest proportion at 94%. Similarly, in Lithuania, Latvia, Cyprus, and Malta, more than three-quarters of farms produce a standard output below EUR 8,000.

In contrast, among EU-14 countries, only three – Portugal, Greece, and Italy – have more than 50% of farms with a standard output below EUR 8,000. Countries with the lowest proportions of farms in this economic size category include the Netherlands (6%), Belgium (6%), Luxembourg (14%), France (14%), Germany (16%), and Austria (25%).

Small farms across the EU as defined by the size of livestock herds

While the previous section examines the structure of national agricultural sectors across all types of farms regardless of their production focus, in the context of climate policy, it is particularly important to analyse livestock farms with bovine animals. In 2022, **emissions from enteric fermentation and manure management associated with cattle alone accounted for 183 Mt CO_2eq, making them the largest contributors to agricultural emissions (50% of total agricultural GHG emissions)**. The next largest source was agricultural soils – primarily due to fertilizer use – responsible for 108 Mt CO_2eq (30% of total agricultural GHG emissions) (EEA, 2024). By comparison, emissions from enteric fermentation and manure management related to pigs amounted to 26 Mt CO_2eq (ibid.).

Cattle enteric fermentation, as the single largest source of agricultural emissions, represents a critical area for intervention in climate-focused agricultural policies. Therefore, this section focuses on the structure of national agricultural sectors with farms engaged in dairy or beef production.

At the EU level, **over half of all farms with bovine animals (55%) have fewer than 10 livestock units (LSU[6]), while 78% have fewer than 50 LSU**. Generally, as observed above based on the average UAA of farms, EU-13 countries (excluding Malta and Cyprus) generally have a much larger proportion of farms with a relatively small number of animals in their national cattle sectors compared to EU-14 countries. **In all examined EU-13 countries except Estonia and Czechia, over half of livestock farms with cattle fall into the <10 LSU size category**. Romania and Lithuania stand out, with particularly high shares of small farms at 94% and 83%, respectively (see Fig. 2 in Annex I).

Among EU-14 countries, only two have more than half of their livestock farms in the <10 LSU size class (Denmark (50%) and Portugal (63%)). In contrast, countries such as the Netherlands, Finland, Luxembourg, France, and Belgium have relatively low proportions of livestock farms in this category, with fewer than 15% of farms falling below the 10 LSU threshold.

The countries with biggest national cattle sectors (over 100,000 farms) are Romania, Poland, and France. However, the structure of the livestock sectors in these countries differs significantly: in Romania and Poland, farms with 50 LSU or less account for 99% and 92% of all cattle farms, respectively, while in France only 33% of cattle farms fall into this size class. Together, Romania and Poland house more than 50% of all EU farms in the <50 LSU category.

Trends in structure of national farming sectors across the EU

Over the past few decades, European agriculture has experienced significant structural changes, primarily characterized by a **sharp decline in the number of farms and an increase in average farm**

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[5] Standard Output (SO) of an agricultural product is defined as the average monetary value of agricultural output at farm-gate prices, expressed in euros per hectare or per head of livestock in a given region. It does not account for costs, direct payments, value-added tax, or taxes on products.

[6] The reference unit used for the calculation of livestock units (=1 LSU) is the grazing equivalent of one adult dairy cow producing 3 000 kg of milk annually, without additional concentrated foodstuffs.

size. This trend is the result of various socio-economic, technological, and policy factors. According to Schuh et al. (2022), these changes have been particularly evident in the re-specialization of agricultural production, alongside the consolidation of farmland into fewer, larger holdings. Between 2005 and 2020, the number of farms in the EU-27 decreased by 36,7%, from approximately 15 million to 9 million, while the average (mean) size of EU farms increased from 10.9 ha to 17.4 ha (EC, 2022). While the decline was most pronounced among the smallest farms, **decreases in both the number of farms and average UAA have been observed across all size classes of agricultural holdings below 100 hectares**. Conversely, the number of farms exceeding 100 hectares has increased, along with the UAA managed by farms in this category.

It is worth noting that, **despite these significant structural changes in the sector, the total area of land used for agricultural production remained largely stable between 2005 and 2020**, with only a slight increase of 0.3% in total UAA (EC, 2022). During the same period, the total number of livestock, measured in livestock units (LSU), decreased by 6.9% across the EU. This decline included reductions of 4.5% in bovine populations and 6.1% in pig populations, while poultry numbers experienced a slight increase of 0.3%.

Table 2: Change in the number of farms and EU utilised agricultural area by size class (2005-2020)

Size classes in hectares	**Total**	**0.0 ha**	**>0-1.9 ha**	**2-4.9 ha**	**5-9.9 ha**	**10-19.9 ha**	**20-29.9 ha**	**30-49.9 ha**	**50-99.9 ha**	**≥100 ha**
Number of farms	-37%	-41%	-47%	-37%	-29%	-22%	-13%	-10%	-4%	+29%
Utilised agricultural area	0		-41%	-36%	-27%	-21%	-12%	-9%	-3%	+24%

Source: Eurostat

While the trend towards farm consolidation and growth in farm size is observed across the EU, although there are notable regional differences, particularly between newer and older Member States (Schuh et al., 2022; EPRS, 2022).**Farm consolidation has been especially evident in the newer EU Member States** (EU-13), where the decline in farm numbers has been more pronounced than in EU-14 countries. Between 2005 and 2016, the number of farms in EU-13 states fell by approximately 33%, compared to a 28.5% decline in EU-14 countries (Schuh et al., 2022). The more pronounced trend in farm decline and consolidation observed in the new Member States can, in large part, be attributed to historical developments, including privatization and the process of fragmentation of previously state-owned agricultural land in the early 1990s in many of the Central and Eastern European Member States, as well as the subsequent processes of specialization and modernization, accelerated by their accession to the EU (Banski.et al., 2008, Radlinska, 2025)[7]. Overall, the decline in smaller farms in the EU, particularly those with fewer than 50 hectares, has been most significant, reflecting broader trends of rural depopulation and the aging of the farming population. Many of the smallest farms, often managed by older farmers, are either abandoned or absorbed by larger farms, contributing to the overall trend of farm consolidation and the growth in average farm size (EPRS, 2022).

A 2016 study conducted for the AGRI Committee estimates that EU farm numbers could decline by 62% by 2040, leaving approximately 3.9 million farms across the EU based on an extrapolation of current trends (Schuh et al., 2022). The decline in farm numbers is expected to be most pronounced in regions already facing challenges such as depopulation, aging farmers, and limited economic opportunities. A key driver of these changes is the demographic shift within the farming population. This process of land consolidation not only reduces the number of farms but also shapes the agricultural

[7] It should be noted that changes in statistical coverage have also played a role in the observed trend, with modifications to the minimum thresholds to defining a farm holding over time. Matthews (2021) observes that this has resulted in quite a dramatic effect for some countries. For example, the data for Czechia shows a fall in the number of holdings between 2007 and 2010 of -42%. However, if the same thresholds were used in both years, the decrease in the number of holdings would only have been -4%.

landscape of the EU, making it more concentrated and specialized, with fewer but larger players dominating the sector (EPRS, 2022; Schuh et al., 2022).

2.2: Small-scale enterprises in feed, food processing, and retail markets across the EU

The EU Commission defines small and medium enterprises using two key variables: staff headcount and either turnover or balance sheet total, defining the ceilings for these parameters for each enterprise size category:

Table 3: Criteria for the classification of small and medium-sized enterprises in the EU (EC, 2020)

Company category	**Staff headcount**	**Turnover**	or	**Balance sheet total**
Medium-sized	< 250	≤ € 50 m		≤ € 43 m
Small	< 50	≤ € 10 m		≤ € 10 m
Micro	< 10	≤ € 2 m		≤ € 2 m

Both financial and employment parameters are important for the appropriate classification of an individual firm. For example, highly mechanized and commercially significant operations may have few employees but should still fall into the larger company categories due to their financial capacity (and, of relevance to this discussion, potential environmental impact). However, enterprise data by balance sheet total or turnover size class is not available at EU level. Additionally, several Member States treat disclosures on the number of enterprises and turnover in different size classes as confidential. These limitations mean that the overview provided below relies solely on the staff headcount criterion when discussing the presence of micro (<10 employees) and small (<50 employees) enterprises, while acknowledging the limitations of this approach.

Meat processing industry

In 2022, the EU meat processing sector comprised approximately 33,086 companies, with **nearly 70% of them meeting the staff headcount criterion to be classified as micro-enterprises** (<10 employees). Another 24% were classified as small enterprises, with fewer than 50 employees. While small enterprises dominate the sector, turnover is concentrated among large companies (>250 employees) which generate 63% of the EU's net turnover.

The countries with the largest number of small processing companies (<50 employees) include Germany, France, and Spain, which together account for over 50% of all small businesses in the industry across the EU. Germany alone is home to a quarter of all small meat processors in the EU. The structure of the national meat processing industries largely mirrors the EU-wide distribution, with the number of firms highly skewed toward smaller size classes, while the turnover distribution is skewed toward the largest companies.

There are no clear-cut differences between the EU-14 and EU-13 countries in terms of net turnover distribution within their national sector structures. All of the countries considered here have a high share of micro-enterprises (<10 employees), which constitute at least 60% of all companies in the industry in all countries except for two: Germany (59%) and Bulgaria (40%) (see Fig. 3 in Annex I).

When examining the prevalence of small companies, **in most EU-14 countries, nine out of ten enterprises in the industry have fewer than 50 employees**. Exceptions include Ireland and Denmark, where small meat processors account for 76% and 85% of national enterprises, respectively. **In half of the EU-13 countries** (Bulgaria, Hungary, Estonia, Romania, Latvia, and Poland), **at least 80% of national companies are small, with this share increasing to 90% or more in the remaining EU-13 states**.

In terms of net turnover distribution, small companies (<50 employees) contribute the largest share of overall turnover in Belgium (30%), Italy (28%), and Bulgaria (24%), followed by Austria, Latvia, and Czechia, where small enterprises account for about a fifth of the total national net turnover.

A noteworthy trend in this context has been the increasing vertical integration in EU agri-food value chains. While integration occurs generally most frequently in a downstream direction (Chang & Csepi, 2012), this is less the case for livestock-oriented industries, where vertical integration is more common upward, into meat processing (EC, 2022). This dynamic is particularly pronounced in the US, with the notable example of Walmart constructing its own meat processing plants (Walmart 2023) but has also been observed in the case of European retailers (e.g. Sainsbury's beef supply trial (Food Manufacture, 2017).

Dairy processors

In 2022, approximately 13,050 companies in the EU were classified under the NACE code 10.5: Manufacture of dairy products, with **77% of them employing fewer than 10 people and another 16% employing fewer than 50 people**. As is the case with other industries in the food sector, **turnover is highly concentrated among a small number of large companies**. Of the 18 Member States for which sufficient 2022 data is available, small processors (<50 employees) make up 93% of all dairy processors but generate only 9% of the total turnover.

The countries with the largest numbers of small processing companies (<50 employees) include Italy, France, Spain, and Poland, which together account for over 50% of all small and micro businesses in the industry across the EU.

Similar to the meat processing industry, there are **no significant differences in the industry structure between the EU-14 and EU-13 countries**, with relatively small variations across all EU countries. The four countries with the lowest share of micro enterprises (<10 employees) in this sector are 'new' Member States: Lithuania (43% of companies), Bulgaria (52%), Latvia (56%), and Estonia (65%). Nearly all of these countries have fewer than 100 enterprises in total, except for Bulgaria, which has 308 companies. In all other countries, at least two out of three enterprises are micro, with Germany having a slightly lower proportion of micro companies at 66% (see Fig. 4 in Annex I).

When considering all small companies with fewer than 50 employees, at least 8 out of every 10 companies fall into this category in nearly all EU countries, except for Lithuania, Estonia, and Latvia.

Among the 18 Member States with sufficient data, the countries with the highest share of national turnover generated by small enterprises (<50 employees) are Germany (30% of 790 companies), Hungary (30% of 140 companies), and Romania (24% of 726 companies).

Dairy cooperatives in the EU

The EU's farming sector features a significant presence of cooperatives, reflecting the opportunities they offer to farmers in terms of market access, cost reduction, and enhanced bargaining power. While recent data on the prevalence of cooperatives in the EU is scarce (Kiisk & Varnik, 2023), in 2010, agricultural cooperatives held an estimated average market share of 40% across the EU (Bijman et al., 2012). A 2015 COGECA report noted that, as of 2013, there were approximately 22,000 agricultural cooperatives in the EU, comprising over 6 million[8] members and generating a total turnover of up to EUR 347 billion. Notably, the 100 largest agricultural cooperatives demonstrated significant growth in the assessed period, with an 18% increase in total turnover between 2011 and 2013 (COGECA, 2015).

However, the history, operation, and market share of cooperatives vary substantially across Member States due to regional historical developments. While in northwestern Europe, cooperatives are often associated with successful, internationally-oriented enterprises, in newer EU Member States,

[8] The estimate represents the number of memberships registered at all of the included cooperatives, without accounting for multiple memberships, and therefore may exaggerate the number of farmers who belong to a cooperative.

cooperatives are sometimes viewed through the lens of their socialist heritage, which influences their market share and public perception.

Cooperatives are particularly important in the dairy sector. While the overall market share of agricultural cooperatives in the EU averaged 40%, their share in the dairy industry was notably higher, at 57% (Bijman et al., 2012). Dairy cooperatives operate across nearly all segments of the food supply chain, from milk collection and processing to producing branded or private-label products and directly supplying retailers. In 2010, dairy cooperatives held more than 50% of the market share in 13 EU Member States, with cooperatives' presence particularly prominent in Scandinavian countries (Sweden, Denmark, Finland), as well as in Ireland and Austria, where market shares exceeded 90% (ibid.).

Feed manufacturing

The feed manufacturing industry across the EU is highly concentrated, with relatively few firms holding a significant share of the sector's turnover. In 2022, there were 6,000 companies in the EU identified by NACE code 10.91 (farm animal feed production). However, Eurostat statistics on turnover and enterprise size are only disaggregated for NACE code 10.9 (Manufacture of prepared animal feeds), which is broader than farm animal feed production alone. While not entirely representative, the data suggests that small enterprises dominate the sector within NACE 10.9, while turnover is highly concentrated among a few large companies. Across the EU, **92% of animal feed manufacturing companies employ fewer than 50 people, yet these companies account for only 18% of the EU sector's turnover**.

Data from the five largest feed-producing countries – Germany, Spain, France, the Netherlands, and Poland – together responsible for approximately 71% of the sector's net turnover in the EU, shows that the structure of the sector at the national level mirrors the EU-wide trend. In all five countries, small companies make up more than 80% of the industry's enterprises. However, the share of industry turnover generated by small enterprises is very small, ranging from 11% to 15%. The exception is Spain, where small enterprises account for 32% of the national industry's net turnover (see Fig. 5 in Annex I).

Other Member States with a relatively large number of small enterprises in the sector (more than 400 enterprises) include Romania, Czechia, and Italy. In Romania and Czechia, the sector structure mirrors the EU-wide pattern, with small enterprises contributing just 16% of the national industry's net turnover in both countries. In Italy, however, small enterprises account for 43% of the national turnover, making it the largest outlier in terms of the contribution of small enterprises to the industry's turnover in the EU, based on the available data.

Retailers

When examining the "Retail sale in non-specialized stores" (NACE 47.1) category[9], there are 468,000 enterprises across the EU, 91% of which have fewer than 10 employees, and another 7% have fewer than 50 employees. At the Member State level, the national retail sectors appear similarly fragmented. Although the patterns are generally similar across the EU, some differences can be observed in the share of micro enterprises (<10 employees) between EU-14 and EU-13 countries. **In all EU-13 countries, the share of micro businesses is 85% or higher, while several EU-14 Member States a lower share of micro businesses**, including Denmark (50%), Germany (67%), Finland (67%), the Netherlands (73%), Sweden (75%), and France (83%).

However, when considering the overall share of all small enterprises (<50 employees), there is more convergence in the structure of national industries, with companies in this category making up over 90% of all companies at the national level in all Member States (see Fig. 6 in Annex I).

[9] Eurostat provides no disaggregated enterprise-level information for the sub-category of "Retail sale in non-specialized stores with food, beverages, or tobacco predominating" (NACE 47.11).

Where the differences are more pronounced is in the proportions of net turnover generated by different size classes. Small enterprises generate both the largest and smallest proportions of national net turnover in EU-13 countries. For example, small retailers in Bulgaria, Cyprus, and Poland generate more than 30% of the net turnover in their national industries, while in Croatia, Estonia, and Slovenia, small companies contribute less than 10% to total net turnover. In contrast, EU-14 countries are relatively more homogenous in terms of the share of net turnover generated by small companies (11-30%). Even with this limitation, turnover within the non-specialized retail segment is highly concentrated, with just 1,260 enterprises responsible for approximately 70% of the industry's total turnover at the EU level.

In the case of the retail sale of food, beverages, and tobacco in specialized stores, companies with more than 50 employees constitute only 0.3% of all enterprises in this category within the EU. The contribution to total net turnover is more evenly distributed across the different size categories, with small companies (<50 employees) contributing 80% of the total net turnover (compared to 18% in the non-specialized retail category). The overall turnover in this segment is, however, much smaller, with EUR 140 billion generated by all specialized food, beverage, and tobacco retailers compared to EUR 929 billion generated by non-specialized retailers in the >50 employee size category.

2.3: Means of mitigating potential negative impacts on small enterprises

A climate policy that places emission reduction obligations on individual businesses is likely to involve a range of administrative and compliance costs, as outlined in the previous input paper. Small farms and food enterprises, with their relatively limited capacity and leverage, may face a disproportionate burden in meeting the policy's requirements. To address this, particular attention should be given to policy design that avoids overburdening SMEs and takes advantage of opportunities for simplification.

At the same time, the introduction of a new climate policy carries the **potential to rebalance existing power dynamics within the sector and create opportunities for redistribution**. By introducing new incentives, such policies can unlock fresh business opportunities and support the development of innovative business models for SMEs. These changes could, in turn, benefit rural regions, aligning with the goals of the Commission’s long-term Vision for the EU’s Rural Areas.

Use of de minimis thresholds in the case of directly regulated sectors[10]

In the case of policies such as the Mandatory Climate Standard (MCS) and the Emissions Trading System (ETS), a clear approach to protect smaller businesses, and thereby shield vulnerable regions and social groups, is to define the policy's scope in terms of the size of obligated entities and establish phased timelines for compliance based on business size.

An on-farm ETS presents a clear opportunity for the direct protection of small farms. **By setting a threshold based on livestock units (LSU), farm size (e.g., hectares), or a combination of both, there is a clear opportunity to protect smaller farms**. For arable farming, a theoretical threshold of 50 ha would allow for the exclusion of large numbers of smallest farms – as well as more generally a bigger share of holdings in the agricultural sectors of eastern and southern European countries, many of which are less developed or more exposed to the impacts of climate change. This would imply that the majority of EU-13 countries (except Slovakia, Estonia and Czechia), along with Mediterranean countries like Italy, Portugal, and Greece, could have at least 90% of their agricultural holdings excluded from the policy. Depending on the specifics of the policy design, these farms could benefit from the

[10] Examples of de minimis thresholds for food processors and retailers are defined on the basis of employee numbers, as other data e.g. regarding net turnover, balance sheet totals or production volumes is not readily available. However, these and other parameters should be considered as a possible alternative basis for the setting of thresholds.

advantages of not incurring compliance costs or from the potential to sell carbon farming units into the system[11].

Setting de minimis thresholds for cattle farms in the context of EU environmental regulation has previously been a subject of political debate, notably in the context of the latest revision of the Industrial Emissions Directive. The proposal for the revised directive included a suggested threshold of 150 LSU for all farms, including cattle, which was rejected in later rounds of negotiations. While more recent farm coverage data is not available for such a threshold, the inclusion of cattle farms above a 100 LSU threshold would entail the participation of 12% of the biggest cattle farms in the policy at the EU level. The coverage of farms in EU-13 would be lower than the EU average for all countries except for Czechia (17%) and Estonia (15%), and higher than the EU average for all EU-14 countries, except for Austria (2%) and Portugal (9%), with a particularly high share of all cattle farms covered in the Netherlands and Luxembourg (51%).For an on-farm ETS targeting cattle farms, setting **a theoretical threshold of 50 LSU[12] would exclude over three quarters of beef and dairy farms in most EU-13 countries** (except for Czechia and Estonia), as well as Austria and Portugal. Countries like Romania, Lithuania, Slovenia, and Croatia, Poland, Latvia, and Bulgaria would have more than 90% of cattle farms outside the scope of the policy. In contrast, wealthier countries like the Netherlands, Luxembourg, France, and Belgium would have more than half of cattle farms domestically participating in the system. Additionally, other scope restrictions should be considered, such as those relating to small extensive livestock production in certain regions or specific modes of organic production, to ensure smaller farms prioritizing integrated systems are not disadvantaged.

Other industries along the agri-food value chain also have high levels of concentration, offering the opportunity to exclude small enterprises from the policy scope while still capturing a large share of turnover and associated emissions. For example, **in meat processing, setting a threshold of 50 employees would regulate companies generating approximately 84% of the total EU turnover in the sector, while excluding 94% of all meat processors in the EU**. **In dairy manufacturing, a 50-employee threshold would exclude 93% of dairy processors across 18 EU Member States for which 2022 data is available but would still include companies responsible for 91% of total net turnover in the EU.**

The impact of such thresholds on national industries would be relatively more homogeneous than when setting thresholds for agricultural holdings, as described above. For example, in meat processing, all EU-14 Member States, except for Ireland and Denmark, would have at least 90% of meat processors outside the policy's scope. This would also be the case for smaller EU-13 countries like Czechia, Slovenia, Croatia, Lithuania, Slovakia, and Malta. The share of meat processors subject to the policy would be only slightly higher in other EU-13 countries, such as Bulgaria, Hungary, Estonia, Romania, Latvia, and Poland (82%-89% of national processors).

In the case of retailer MCS, excluding companies with fewer than 50 employees would generally cover most turnover without burdening the large proportion of small and micro enterprises in the sector. The effects would be relatively homogeneous across the EU in terms of the share of national enterprises affected. However, setting this threshold would also exclude a potentially significant share of net turnover – 47% in Romania, 37% in Cyprus, and 34% in Poland – potentially impacting policy effectiveness. If companies under the NACE code "Retail sale of food, beverages, and tobacco in specialised stores" were regulated, excluding all small companies (< 50 employees) would result in regulation of only about 1,075 businesses (0.3%) across the EU, with over 40% of these businesses concentrated in Germany.

[11] De minimis thresholds do not apply to any ***voluntary*** stand-alone policy interventions (e.g. carbon farming procurement), or voluntary aspects of a new policy (e.g. possibility to sell carbon farming units to obligated entities by non-obligated farms). Any farm would have the possibility to sell CRCF units regardless of its size.

[12] Please note that these thresholds are presented as examples only. The environmental effectiveness of specific thresholds would need to be evaluated based on emissions data, which would have to be compiled before specific policy decisions are made.

Finally, the inclusion of small and medium sized enterprises can be dynamic, with lower thresholds gradually implemented over time, **giving smaller enterprises time to prepare for compliance**.

The EU's Corporate Sustainability Reporting Directive (CSRD), which mandates scope 3 GHG emissions reporting by large and listed businesses, covers companies which exceed at least two of the three following criteria: (a) balance sheet total of at least EUR 25 000 000; (b) net turnover of at least EUR 50 000 000; and (c) average number of employees during the financial year of 250 or more.

Public data is not sufficient to quantify how many companies at different stages of the agri-food value chain are included within the scope of the policy based on all these criteria. However, if a climate policy were to solely adopt the size threshold of 250 employees or more used in the CSRD, the policy would cover a total of 270 large businesses in the dairy industry or 526 businesses in the meat processing industry at the EU level. At Member State level, this would entail the coverage of 3% or less of national enterprises in all EU countries except Ireland (10%), Denmark (8%) and Romania (4%).

In the case of non-specialized retailers, this threshold would result in the inclusion of 1,261 businesses in the scope of the policy EU-wide. The percentage of national non-specialized retailers obligated under the policy would not exceed 1% in any Member States, except for Finland (1.3%), Slovenia (1.6%), Estonia (2%), and Luxembourg (3.2%).

Determining the point of obligation – impacts on small entities in directly and indirectly regulated sectors

As outlined above, a climate policy with an **on-farm point of obligation offers the most direct means of protecting small farms through targeted exclusions**. The threshold for an on-farm ETS directly determines which farms incur compliance costs and which gain a competitive advantage by avoiding these costs or benefiting from carbon farming unit sales (discussed further below).

In the case of off-farm points of obligation in an MCS or ETS policy, a de-minimis threshold would clearly benefit small entities in the regulated sector (small processors or retailers). However, the specific knock-on effects on smaller farms within the supply chains of the obligated companies are less straightforward and will depend heavily on the design of the MRV and trading mechanisms. They may also need to be addressed through flanking policies. While small farms are more prevalent in EU-13 countries, this is not the case for small businesses in the food sector, which are generally no more common in EU-13 than in EU-14 as a percentage of all domestic companies. Exempting small manufacturers in these countries will not necessarily mitigate negative impacts on small agricultural holdings specifically, and further research into sourcing flows across the EU would be necessary to determine the likely outcomes. Ensuring that small farms are not disproportionately affected in the case of a climate policy with an off-farm point of obligation (for example, by having to meet MRV requirements imposed by the processors they supply) would require other dedicated design choices, for instance, the design of the trading of carbon farming units between non-farming companies and the farmer, as outlined in the following section.

To avoid disadvantaging specific types of smallholder suppliers (e.g., small extensive cattle farms), retailers could present evidence that the relatively unprocessed products like beef, veal, and milk that they sell are originally sourced from such farms. Based on straightforward activity parameters, the related embedded emissions could be exempted from the total carbon footprint of their product assortment, which forms the basis for their emission reduction obligations. In cases where these smallholders are able to evidence GHG reductions or removals against the baseline, CRCF certificates of compliance could also be used for verification purposes.

When selecting an off-farm point of obligation in the process of policy design, the ease with which small businesses can adapt their product offerings in the near term may warrant consideration. Small retailers may have more flexibility at the outset of policy implementation in terms of portfolio diversification when compared with upstream processors who may have fewer immediate options which do not involve downsizing overall production. In the medium term, processors are likely to have greater opportunities to cooperate with their farmer suppliers to introduce sustainable practices, while this avenue may remain less readily available to retailers. Thus, the capacity of small retailers to meet policy requirements may be greater than that of small, specialised food processors, suggesting potentially lesser need for an adjustment period.

In the context of an ETS, the free allocation of allowances is another approach available to lower the relative cost for small enterprises. Allocating allowances for free to small enterprises would allow them the opportunity to profit from the sale of these free allowances to other obligated entities, provided they are able to reduce emissions. Alternatively, smaller enterprises could be obligated for only part of their emissions – similar to the approach used in the maritime sector under the ETS. Given the additional complexity that the use of free allocation would entail, focusing on the use of de minimis thresholds as the main tool to mitigate negative impacts on small enterprises may offer a more efficient and preferable approach from a policy simplification perspective.

Trading mechanisms set-up

Several options to mitigate the impacts of the policy on smallholder farmers – or even rebalance some of the existing power differentials – could be implemented through the design of the trading system for emission reduction and carbon removal units.

The option likely to provide the regulator with the most leverage to ensure that impacts on small operators are minimised would be the inclusion of an intermediary, e.g. through the Commission creating a central pool of credits, used to manage the purchase and sale of carbon farming credits to the obligated entities. The role of the Commission – or an alternative institution like a carbon central bank – in protecting small farms would be equally relevant for all three types of policy options under consideration. **In the case of any policy involving the central purchase of credits, the Commission could maximize opportunities available to small farmers by setting minimum prices for credits and providing medium- to long-term certainty that generated units will be purchased**.

Compared to the carbon farming procurement option, the MCS and ETS options offer an added advantage, in that they **create new demand for carbon farming units driven by the policy**. This **enables the Commission to allocate more resources and purchase additional units** from smallholders at higher prices, knowing these units can later be sold to obligated entities, thereby minimizing the impact on the public budget.

.On the other hand, separating markets for carbon delivery and food supply without regulatory intervention to mediate supplier-buyer relationships could increase complexity, disadvantaging smaller farms. While large entrepreneurial farms may benefit from the opportunity to seek out buyers offering higher prices, participation in such a market is likely to entail additional transaction costs, connected to e.g. information gathering, while offering less security and financial certainty to smaller farms. Leveraging the opportunities for group auditing and certification offered by the CRCF and participation in cooperatives may help to mitigate those challenges and navigate the market.

While centralised CRCF unit purchases provide room for interventions by the Commission and Member States to mitigate impacts on small enterprises and less developed regions, it should be noted that in some markets and value chains, fostering close relationships between downstream actors and farmers may be preferable. For example, dairy cooperatives have direct access to their farmers, making it easier to monitor carbon footprints and support suppliers in adopting more sustainable practices. This approach may be more beneficial for small farmers in these supply chains, particularly given the additional costs associated with certification. Therefore, the design of the policy should not inadvertently promote severing these relationships. Mixed solutions could also be considered to accommodate these scenarios, such as requiring a certain percentage of reduction obligations to be evidenced through the supply chain, while being complemented by units purchased from the centralized pool. The requirement for evidencing reduction within own supply chain should be carefully considered to avoid undue burden being passed on to small farmer suppliers.

Certain mitigating features are already built into the EU certification framework, with **the CRCF regulation allowing for the use of simplified certification and auditing rules, such as group auditing, to avoid disproportionate burdens on small farmers**. Cooperation among farmers can be an effective way to lower barriers to access to the carbon market for smaller farmers. However, it is important to note that not all farmers stand to benefit equally from these arrangements, as farm cooperation agreements are not equally distributed across the EU. There is a lower level of willingness to cooperate among smallholders in certain central and eastern EU countries, although recent figures show changing attitudes (EPRS, 2022). The introduction of new market-based incentives through new climate policy interventions can further complement existing EU policy tools fostering farmer cooperation between farmers and providing financial support to cooperative-led initiatives.

Overall, while ensuring that the price offered for CRCF units covers the costs of mitigation for smaller farmers is essential in any policy setup, it is also **crucial to ensure that prices paid to small farmers for delivering food to the market do not decrease due to the overall compliance costs incurred by downstream entities** being passed upstream. This means that interventions outside the scope of the policy will likely be necessary. These could include public funding to alleviate transaction costs for smaller enterprises in less privileged regions, improving the availability and accessibility of independent advisory services in those regions, and implementing measures to regulate food delivery contracts to prevent abuse of market power. Possible accompanying measures will be discussed in more depth in the final workshop of the series ('Enabling').

Discussion Questions

- Are there any characteristics or factors related to farms or food companies not discussed in the paper that should be considered when determining thresholds for exclusion from the policy's scope, less stringent climate policy requirements, or more targeted assistance from a cohesion perspective?
- How do you view the balance between the potential for climate policy design to mitigate impacts on small businesses versus the need for additional flanking interventions?
- To what extent a centralised pool for CRCF units could be an effective solution for addressing the challenges faced by food SMEs and smallholder farmers under the proposed policy options, particularly in less developed regions?
- How important are existing supply chain relationships in ensuring the long-term success of smallholder farmers and small food businesses? What advantages do these relationships offer compared to more centralised trading of CRCF units, particularly for smaller businesses and less developed regions?

Section 3: Economic activities in rural areas

3.1: Economic situation in rural areas across the EU: trends and drivers

GDP per capita and poverty levels

The **GDP per capita rate in rural regions has been on an increasing trajectory** since 2003 (see Figure 1 in Annex III), although in 2009 there was a larger contraction in rural regions due to the economic crisis, and in 2020 the GDP/capita decreased due to impacts of the Covid pandemic. In current price terms, the GDP/capita in rural regions is approximately 35% higher in 2020 than in 2008. In 2020, the GDP/capita had increased in rural areas compared with 2010 in every EU Member State, with the exception of Greece (see Figure 2 in Annex III). Most of the EU's GDP is concentrated in predominantly urban regions (50.9%), while rural areas constitute the smallest share (15.4%); in just two Member States, rural regions accounted for a higher share of GDP (Ireland and Romania) (Eurostat, 2024).

The main component of GDP from the output side is gross added value[13] (GVA), which can be analysed according to the statistical classification of economic activities (NACE). In 2021, market services

[13] Defined as a measure of the value of goods and services produced in an economy. It represents the contribution of each economic activity to the overall GDP and is calculated as the difference between the output of goods and services and the intermediate inputs used in their production. GDP is the sum of the GVA of all economic activities within an economy plus taxes on products minus subsidies on products.

accounted for the highest share of value added in both urban (58%) and rural (38%) areas; industry accounted for 28% of GVA in rural areas compared to 15.5% in urban areas; public/non-market services were comparable in urban (21%) and rural (22.7%) areas; construction contributed to 4.6% GVA in urban areas and 6.7% in rural areas; and agriculture, forestry and fishing contributed to 4.3% GVA in rural areas compared to just 0.6% in urban areas (see Figure 3 in Annex II).[14]

In 2023, the EU's **poverty rates were relatively similar across urban and rural areas**, with risk levels at 21.6% in urban areas, and 21.4% in rural areas. Such small differences between urban and rural areas reflect a trend for the past decade with the gap decreasing over time, and overall poverty rates in both urban and rural areas going down as well (see Figure 5 in Annex II).[15] In some Member States the poverty rate in rural areas increased between 2010 and 2020, including Cyprus, Estonia, Italy, Luxembourg, Netherlands, and Sweden (see Figure 6 in Annex II). While the gap between urban and rural poverty rates is extremely small at the EU level, the gap for rural areas is larger than 5% in 7 Member States[16], with the gaps in Bulgaria and Romania being the largest at a >15% difference between urban and rural areas. Overall, over 25% of the rural populations in Spain, Greece, Italy, Croatia, Cyprus, Estonia, and Latvia are living in poverty, while over 45% are living in poverty in Romania and Bulgaria; however, less than 12% of rural populations are living in poverty in Austria, Czechia, and Netherlands.

In Europe, the economic growth and poverty problems have differing drivers from urban areas. Distances from metropolitan areas, low population density, and the absence of large settlements create accessibility issues, increasing costs and complicating the functioning of the labour market in rural areas. Labour markets in sparsely population regions face challenges in labour-skills matching with firms, and thus facilitate lower productivity, which is then reflected in lower incomes, a lack of qualified job opportunities, and selective outmigration of a significant proportion of the skilled labour (Bernard 2019). Low population density can also create participation barriers in the labour market due to transport costs (Coombs et al 2008). Within rural areas, there is **differentiation between more sparsely populated areas and peri-urban countryside**; with the latter there is better accessibility to cities, offering easier participation in metropolitan labour markets. This proximity to urban areas partially explains differences between individual Member States; for example, in Scandinavian countries more than 75% of rural inhabitants live in close proximity to urban areas (Bernard, 2019). A country's ***overall economic development*** **is also theorised to influence rural poverty rates**. In less developed economies there is usually a significant economic imbalance to the detriment of rural areas, lowering living standards (Young 2013), which usually decreases with rising levels of economic development (Easterlin et al., 2011). This decrease is often due to increased investments in connectivity between rural areas and cities, causing patterns of living standards to become increasingly balanced over time (Requena, 2016).

The importance of agriculture in rural areas also plays a role in poverty levels. According to Bertolini et al. (2008), three aspects of the importance of agriculture contribute to increasing poverty risks: volatile incomes, seasonality of work, and small farm holdings with poor productivity. In some EU countries, agriculture falls under low-wage sectors, increasing the likelihood of poverty among farmers. As discussed in the previous input paper, volatility in commodity prices can impact farmer income. However, these risks are acute for countries with a larger proportion of small farm holdings. Semi-subsistence farmers are particularly at risk for poverty (Walsh & Harvey, 2013). For many rural regions in the EU, the importance of agriculture in rural economies has been decreasing, which has been accompanied by a profound restructuring of the economic base of rural areas, as evidenced by the GVA of agriculture across north-western EU Member States, such as Denmark, Belgium, Czechia and Germany; in these Member States, farm structures have largely been consolidated over a long period

[14] The GVA for agriculture, forestry, and fishing in rural areas was highest in Lithuania (14.1%), Latvia (13.8%), and Bulgaria (12.3%), whereas it was the lowest in Ireland (1.9%), Belgium (2.1%), and Denmark, Austria, and Slovenia (3.1% each) (see Figure 4 in Annex II).

[15] The biggest decreases of poverty rates in rural areas between 2010 and 2023 occurred in Austria, Croatia, Czechia, and Denmark, while in Ireland, Latvia, Lithuania, Poland, Slovakia, Hungary, Portugal and Romania poverty rates decreased in both urban and rural areas.

[16] Bulgaria, Croatia, Cyprus, Poland, Latvia, Romania and Portugal

of time. However, in Member States where agriculture still represents a more important contribution towards the economy, such as Greece, Bulgaria and Romania, there is still a high-level of fragmented farm structures (as evidenced by the proportion of farms which are categorised as family farms – see below). Thus, a relationship between farm fragmentation and the importance of the agricultural sector to rural areas are a significant influence behind the rural-urban poverty gap in certain Member States (see Bernard, 2019).

In Central and Eastern European economies, **the post-socialist transition period has widened the gap between urban and rural areas**, with rural poverty emerging as a significant issue. Economic restructuring has affected rural areas, with rural residents having lost many job opportunities with the collapse of state and cooperative farms, the rationalisation of agricultural production or rural deindustrialisation, and a weakening of commuting patterns (Swain 2016). Rural restructuring particularly affected former employees of state-owned farms, losing economic opportunities due to plant closures, especially in areas with barriers in accessing urban areas (Dymitrow et al., 2018). At the same time, poverty in urban areas decreased with increasing foreign direct investment (Spoor, 2013).

The experience of post-socialist Member States has not been uniform: an overall poverty gradient can be observed in the CEE region, with the most striking differences in rural and urban poverty found in Bulgaria and Romania. On the other end of the spectrum, in post-socialist Czechia, Slovakia and the former East Germany, agricultural transformation resulted in the emergence of large agricultural holdings, compared to the significant fragmentation in Romania and Bulgaria where the most striking differences between urban and rural poverty are found (Bernard, 2019). This considerable poverty gap is attributed to a combination of insufficient industrialisation in the countryside during the socialist period and the dismantling of large-scale state-run capital-intensive agricultural production systems into small, lower-productivity farms during the 1990s[17] (Macours & Swinnen, 2008). This process led to significant costs, including the loss of economies of scale and technological disruptions (ibid). Rural areas in these countries also faced a shortage of off-farm employment opportunities, leaving many households trapped in semi-subsistence farming (Bernard, 2019). In contrast, rural areas in Czechia and Slovakia benefitted from stronger national economies and avoided significant labour market disruptions caused by the transformation of agriculture.

Employment patterns

The decline in the poverty rate gap between urban and rural areas over the past decade is largely attributed to changes in employment opportunities in rural regions combined with slower improvements to poverty rates in urban regions (Wochner & Holzhausen, 2019; Grzega, 2019; Meloni et al., 2024). The growing importance of **non-agricultural income in rural households is contributing to the reduction of the poverty gap**, with the rising significance of off-farm revenue arising from the tourism sector, followed by manufacturing, specialist food and drink, and IT (Meloni et al., 2024). Tourism has undoubtedly boosted economic growth in rural areas, contributing to job creation (Grodzicki & Jankiewicz, 2022). Initiatives introduced to improve skills through vocational training and lifelong learning are also helping rural populations transition into other sectors, leading to a greater diversification of employment across sectors (Hodge & Whitby, 2024). Improvements in rural broadband connectivity have enabled more rural inhabitants the opportunity to work remotely (Bisello et al., 2024).

Unemployment rates decreased between 2013 and 2023 at the EU level, in both urban (12.3% in 2013 versus 6.7% in 2023) and rural regions (10.8% in 2013 versus 5.3% in 2023). Decreases in unemployment in rural areas occurred over this ten-year period in every Member State, with the exception of Romania (see Figure 7 in Annex II). Unemployment rates were relatively high in 2013 in the aftermath of the global financial and sovereign debt crises. While at the EU level unemployment is lower in rural regions, trends are not consistent at the Member State level.[18] In 2023, the lowest rates

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[17] After the collapse of socialism, land reform policies were introduced to dismantle these large agricultural entities. The objective was to return land ownership to private individuals, often the descendants of pre-socialist landowners. This process involved dividing the large farms into many smaller parcels of land, which were distributed to private households or individuals.
[18] In ten Member States, unemployment rates were higher in rural regions in 2023 compared to urban areas (Bulgaria, Greece, Spain, Croatia, Lithuania, Luxembourg, Hungary, Poland, Romania, and Slovakia – see Figure 8 in Annex II).

of unemployment (<3%) in rural areas were in Germany, Czechia, Netherlands, and Austria, whereas the highest rates (>10%) were in Spain and Greece. The youth unemployment rate in the EU is generally twice as high as the overall unemployment rate. In rural areas, youth unemployment is highest (>20%) in Greece, Spain, Romania, and Sweden. Between 2013 and 2023, the youth unemployment rate went down by more than 10% in both urban and rural areas. In 2023, unemployment for youth was lower in rural areas compared to urban areas in every Member State, except for Bulgaria, Greece, Lithuania, and Romania (see Figure 8 in Annex II).[19]

In predominantly rural regions, the highest share of employment across the EU is in the market services sector (33%), followed by public non-market services (28%), industry (20%) and the agriculture, forestry, and fishing sectors (11%) (see Figure 10 in Annex II). **Employment in agriculture, forestry, and food has been decreasing at the EU level** for the past 15 years.[20] This pattern is also observed almost uniformly at the Member State level, with the exception of Hungary and Italy (see Figure 12 in Annex II). Currently, the highest levels of employment in the agricultural sector are Romania (~20%), Greece (10%), and Poland (9%).[21]

Such **changes in employment patterns have been linked to EU-level policies aimed at facilitating diversification in employment** across sectors over the past 15 years (see Hill et al., 2019; Hodges & Whitby, 2024; Grodzicki & Jankiewicz, 2022, Harvey, 2019; Papadopoulous, 2015). Under EU policies, direct intervention in the employment levels and patterns seen in rural regions largely comes from actions under the Structural and Investment Funds, which are reinforced through a range of national policies and other EU policies indirectly impacting employment: the European Regional Development Fund primarily focuses on regions which are lagging behind and focuses on large-scale infrastructure investments; the European Social Fund focuses on workers, young people and people seeking jobs by enhancing their skills and assisting their transition to employment; the Cohesion fund focuses on countries lagging behind in their Gross National Income per capita, comprising CEE Member States as well as Greece and Portugal; and the European Agricultural Fund for Rural Development focuses on a mix of projects, including structural change in agriculture and improvements in its economic performance. Programmes such as LEADER I, LEADER II, LEADER+ have been aimed at the creation of new economic activities, revitalising living standards, transfer of know-how and innovation, whilst protecting and preserving regional identity and culture in rural areas. While the implementation of policy interventions at the EU are highly correlated with changes in employment in rural regions (Grodzicki & Jankiewicz, 2022), the direct contribution to employment in rural regions is difficult to assess due to missing systematic reporting on job creation (Berkeley et al., 2019).

Aging rural populations and generational renewal

Although the trends in GDP, poverty, and employment are indicating positive signs for the trajectory of rural areas in the EU, these trends should be treated with caution, namely due to **ongoing phenomenon of migration from rural areas to suburban and urban areas**, as well as the process of peri-urbanisation. In recent years, the EU's rural population has been decreasing, whereas in contrast urban populations are growing on average each year (Council of Europe, 2021). As of 2023, working-age people account for approximately 55% of the total inhabitants in predominantly rural regions, while working age people account for 60% of the population in predominantly urban areas (Eurostat, 2024). Elderly inhabitants over the age of 65 account for 25% of the rural populations in Europe, whereas older inhabitants make up 20% of the urban populations. As of 2023, the EU age dependency ratio[22] was 70.8% - in urban regions the ratio was 66.9%, whereas in rural regions the ratio was 76%.[23] The old-

[19] The unemployment rate for youth in rural areas went down between 2013 and 2023 for every Member State, except Luxembourg and Austria (see Figure 9 in Annex II).
[20] Employment in agriculture specifically has shrunk from 5.5% in 2008 to 3.4% in 2022 (see Figure 11 in Annex II). In particular, Romania, Croatia, Portugal and Slovenia experienced a >5% decrease in employment in agriculture between 2010 and 2020.
[21] The lowest levels of employment in agriculture are Luxembourg (0.7%), Germany (1.1%), Sweden (1.1%), and Denmark and Slovakia (both 1.9%).
[22] Defined as the sum of the number of young people aged less than 20 years old and the number of older people aged 65 years or over divided by the number of working-age people aged 20-64 years. The ratio is expressed in percentage terms.
[23] The age dependency ratio was highest in France (90.1%) and was also relatively high in rural areas of Sweden and Finland.

age dependency ratio[24] in the EU was 36.4% as of 2023; however, the ratio in predominantly rural regions was 40.5%.[25]

Economic challenges in predominantly rural regions, such as **fewer job opportunities, weaker infrastructure, poorer access to public services have in part facilitated net emigration rates** of younger inhabitants, who seek greater opportunities in urban areas (Nunez Ferrer et al., 2023). The number of young people in rural areas has decreased due to internal and external migration: during the past 15 years, a significant number of young people have migrated from rural areas to urban areas within their home country, as well as to also live and work abroad (Council of Europe, 2021). Approximately one-third of rural regions reported a negative crude rate of net migration between 2015-2022, with 17 regions reporting a fall of more than 10% (Eurostat, 2024).[26] This in turn, affects the birth rates and lowers the rate of natural population change in predominantly rural areas, resulting in an ageing population and fewer people of working age. Indeed, rural regions have comparatively lower birth rates in 13 out of 21 Member States for which data is available.[27] The emigration of young people from rural regions, as well as an ageing population, is leading to a decrease in the labour force, which in turn impacts economic opportunities in rural regions.

Mirroring demographic changes in rural areas, **the farming population of the EU is also increasingly aging** – the average age of an EU farmer is approximately 57 years old. As of 2020, over 33% of EU farmers were over the age of 65, whilst less than 12% of EU farmers were 39 years old or younger (see Figure 13 in Annex II). More than 50% of farmers in Portugal are over 65, while in Cyprus, Spain, and Romania, more than 40% of farmers are over 65 years old. Austria and Poland have the largest proportion of farmers younger than 40 years old (>20%), while Cyprus, Portugal, Spain, Denmark, and Netherlands have the smallest proportion of farmers younger than 40 (<10%).

As discussed above in section 2 above, approximately 93% of EU farms are classified as family farms (DG Agri, 2023). Family farms play an important role in the share of agricultural employment, and (to a lesser extent) in the value of output. However, demographics are creating a social challenge for family farms, as **inter-generational succession issues are impacted by the economic sustainability of family farming**. Over a third of managers of family farms in the EU are above the age of 65 as of 2020 (see Figure 14 in Annex II), and only 6.5% of managers are under 35 years of age, falling from 7.5% in 2020. However, the age structure of non-family farms skews younger in average age, with the majority between the ages of 45-64 years of age. A higher share of young farmers manages medium and large-sized farms (31.1%) compared to farmers over 65 (2.7%) (see Figure 14 in Annex II), which is partially explained by the attainment of higher levels of education among young farmers. According to Eurostat (2023), the high proportion of farmers over the age of 65 years old poses questions on the attractiveness of farming as a profession for young rural inhabitants.

Generational renewal is highlighted as a priority aim of the 2023-2027 Common Agricultural Policy, and has been addressed in an EIP Agri Focus Group, as well as multiple Horizon projects. Intra-family farm succession is the most common form of generational renewal; this is often perceived to be children formally taking over control of a farm from their parents. While discussions on generational renewal are largely focused on family succession, generational renewal is much broader: on corporate and cooperative farms, management is often formally employed, and generational renewal occurs through attracting new and young farm managers and labour (Pitson et al., 2020). A less frequent form of generational renewal is the establishment of new farms, or the taking over of existing farms by new entrants (ibid).

Succession has been found to be more likely on farms that are more profitable and have a stable market position, as well as higher levels of investment (Cavicchioli et al., 2018). A report by the

[24] Defined as the number of old people at an age where they are economically inactive (65+ years), compared with the number of people working age. The ratio is expressed in percentage terms.
[25] Old age dependency ratios are particularly high in central and northern Finland, most of Germany, and central and southern France, central Italy, as well as interior regions in Greece and Portugal.
[26] 5 regions in Croatia, 4 regions in Bulgaria and Greece, 3 regions in Poland, and one region in Romania
[27] Spain, Italy, Greece, Lithuania and Portugal have particularly low birth rates (ibid).

AGRI Committee in the European Parliament (2023) highlights the challenges for generational renewal, identifying the low profitability of agricultural activities, administrative requirements and the image of the sector as the main barriers to young rural inhabitants becoming farm managers. Other barriers identified include lack of own capital, difficulties in accessing credit, and difficulties accessing technical services and support measures, as well as the effects of climate change. The report stresses challenges in access to land, due to the limited availability of and the cost of renting or buying land as major obstacles for young farmers, especially those who do not come from a farming family. Access to land is limited by the lack of opportunity to inherit land from parents, the low supply of land for sale or lease, as well as competition from other farmers, investors, and residential users, that pushes up land prices (Filmer & Fox, 2014).

Other research stresses the barriers to generational renewal do not necessarily relate to age per se, but rather aging demographics among farmers is a symptom of barriers for new entrants. Farm households with successors are more likely to invest in the future economic sustainability of the farm (Sutherland, 2023), at least a decade prior to the successor formally taking over the farm business (Burton and Fischer, 2014). Farm succession influences managers' decision-making process beyond maintaining current trajectories, whereas farmers without a successor tend to scale back and slide into semi-retirement (Sutherland, 2012). Indeed, Sutherland (2023) argues that issues with generational renewal cannot be resolved through policies to 'persuade' young people to engage in farming, as there is little evidence of a shortage of young people interested in farming. Instead, as an EIP-AGRI report (2016) on generational renewal suggests, there is an **abundance of young people who are interested in farming, who are unable to do so, largely due to financial barriers**. Indeed, a cross-national survey conducted by Zmija et al. (2020) reveals that business opportunities are rarely the primary rationale to start farming: only 3.5% of respondents stated this as their primary reason for becoming a farm manager, whereas 78% of respondents stated "family tradition" as their main motivation, suggesting the influence of family succession in determining entry to farming as a career choice. Nevertheless, young farmers were three times as likely to express "new business opportunities" as their primary motivation for becoming a farm manager compared to older farmers.

3.2: Potential impacts on economic activities in rural areas

Carbon markets offer potential **opportunities for income diversification in rural economies,** increasing the potential profitability of farming. Depending on levels of compensation, opportunities for land managers to receive payments for generating CRCF units can change the value of lands and incomes in rural areas (see, for example, Funk et al., 2014; Dumbrell et al., 2016; Cockfield et al., 2019), although there may be high levels of geographic variability (Plastina et al, 2024). The realisation of the full potential of such benefits to rural economies depends on the establishment of a link between carbon projects on rural land and the finance industry. **On-farm mitigation actions potentially hold significant interest for lenders** (SRUC, 2022). Recognising not only the potential financial opportunities from the sale of CRCF units, co-benefits from certain practices (i.e. those contributing to improved soil health) could reduce risk profiles for agricultural loans by facilitating more reliable farm productivity and improved climate resilience. Thus, the potential sale of CRCF units to obligated entities could be potentially integrated into financial valuations utilised by banks during lending decisions, not necessarily for collateral, but as a means for modifying risk profiles (RICS 2024). The policy options creating carbon markets for CRCF units in which farmers can voluntarily participate in could have implications for generational renewal through opportunities for increasing investments into the long-term financial viability of farms as well as facilitating the increasing attractiveness of financial lending to younger farmers, who are often higher educated with a skill set that is conducive to adopting new climate friendly mitigation practices.

In addition to opportunities with financial lenders, the potential **sale of CRCF units could also potentially be integrated into insurance decisions**. Crop insurance is a prominent risk mitigation approach to protect farmers against extreme weather. Research on the benefits of certain carbon farming practices, such as the use of cover crops, which demonstrate strong co-benefits with risk mitigation have led to recommendations that linking such practices to discounts on farmers' crop insurance premiums could be a valuable financial incentive (Classen et al., 2017; Bryant & O'Connor, 2017; CTIC, 2015; Yoder et al., 2025). Indeed, there are already pilot projects in the United States linking climate adaptation friendly practices to crop insurance through premium discounts (UIUC, 2021; Indiana State Department of Agriculture; Sawadgo, 2020; Turner et al., 2023). Evidence from crop insurance indemnity payments data indicate that such pilot projects have comparatively lower crop insurance losses due to drought, excess heat, or excess moisture.

A strengthened demand for carbon farming activities generated by a new climate policy is also likely to **generate a significantly higher demand for tailored advisory services, creating new business opportunities** that could be realized in rural areas. The provision of appropriate advisory will require a range of different skillsets, combining practical knowledge traditionally gained through agricultural practice with skills requiring higher or specialized education. These may include, for example, carbon footprinting, soil biology, carbon or nutrient management, environmental engineering, or operating digital land management software on farms. Other required services around business development may include establishing the most suitable strategies for the transition to more sustainable modes of production, designing agricultural long-term plans, and assisting with accessing certification and conducting MRV at the required level of complexity. This presents **new opportunities for start-ups and existing companies providing strategic and operational advice and farm management services**. A wider emergence of these employment opportunities could in part help draw a highly skilled workforce to rural areas, energizing and preserving communities in more sparsely populated areas.

One potential impact of growing carbon markets is the incorporation of the value of carbon credits generated from carbon projects into property valuations, **impacting land value in rural areas**. Evidence of such increasing land values due to their carbon potential is already apparent, with a report from the Scottish Land Commission finding increasing levels of investment in land markets due to demand for nature-based credits, with an estimated 87% increase on prices paid for land in rural areas (2023). The report finds increasing interest in both forests and farmland with high restoration potential. However, it is also possible that if incomes of the agri-food sector are affected by the policy options, then the land value of farms could potentially decline, as land capable of yielding greater income tends to have higher market value. Additionally, many farms are managed by operators who are not the landowners – approximately 55% of the utilised agricultural area in the EU is rented (DG Agri, 2021) - and thus, a substantial proportion of rents for agricultural land to landowners who are not farmers. Therefore, there could be risks of increasing rents for agricultural land if land values increase; however, several Member States have regulations limiting how much rents can increase to protect tenant farmers from sudden increases (see JRC, 2021).

Opportunities for the generation of income through carbon delivery also have implications for generational renewal in rural areas. Should the prices of CRCF units be high enough, succession between generations on family farms could potentially stabilise, with farming becoming a **more financially viable career choice** for young rural inhabitants. Targeted incentives for specific carbon farming activities could also help mitigate the risk of land abandonment by addressing its underlying environmental drivers. For example, agroforestry offers numerous benefits well-suited to agricultural systems in mountain regions, which face a heightened risk of agricultural land abandonment due to challenging farming conditions and increasing soil erosion (Schuh et al., 2022). Even modest increases in tree cover on agricultural land in these areas have been shown to deliver significant climate mitigation benefits while enhancing resilience and restoring soils (Zomer et al., 2023). However, it is also possible that, for farms which lack successors, increasing land values may increase pressures for landowners of small and medium-sized farms to sell their land to commercial enterprises focused solely on carbon delivery business opportunities, potentially leading to land speculation by corporate entities and investors.

As of date, there is a scarcity of research on the potential impacts of specifically carbon pricing of agricultural emissions on EU rural consumers and inhabitants. However, there are a handful of studies which have analysed impacts of carbon pricing on rural inhabitants for other sectors, from which some findings could be relevant. Evidence assessing the **impacts of carbon pricing in the energy sectors**

demonstrate mixed results in assessing impacts on consumers in rural areas in comparison with urban areas. Across studies examining developed countries, some predict a larger burden for rural compared to urban or suburban households (Bureau, 2011; Callan et al., 2009; Feng et al., 2010). In EU rural areas, due to the distribution of higher intensity of energy use per capita in more sparsely populated areas, Feindt et al. (2021) predict a larger carbon tax burden, particularly in Bulgaria, Estonia, Hungary and Poland. The authors argue that carbon pricing in agriculture would also have significant implications in disproportionately affecting the costs of consumption of food for low-income rural households. Studies, such as Wang et al. (2019), find inconsistent results across rural regions, with impacts on rural areas being regressive in some regions, while in other regions impacts are progressive. Other studies find no obvious differences between urban and rural regions (Beugin et al., 2016; Wier et al., 2005; Wallenko et al., 2024) or even find urban households experiencing more negative impacts compared to rural areas (Pashardes et al., 2014).

Notably, the urban-rural divide is a weaker driver of relative tax burden compared to country-level characteristics (Feindt et al., 2021), and of the impacts observed, the absolute difference between urban and rural areas within northwestern EU Member States is small (Wier et al., 2005; Callan, 2009). Relevant to the two Mandatory Climate Standards for retailers and food processors, similar results are found not just for carbon pricing policies, but also for policies mandating higher emission reductions (Montenegro et al., 2019). Evidence of **inconsistent impacts across rural regions has been linked to differing levels in the economic importance of specific sectors in terms of both employment and GVA** falling under carbon pricing policies: while in most rural areas the impacts of energy sector carbon pricing are minimal, rural areas facing more substantial impacts are those with significant employment (Wallenko et al., 2024) and GVA (Sands et al., 2011) rooted in the energy extraction industries.

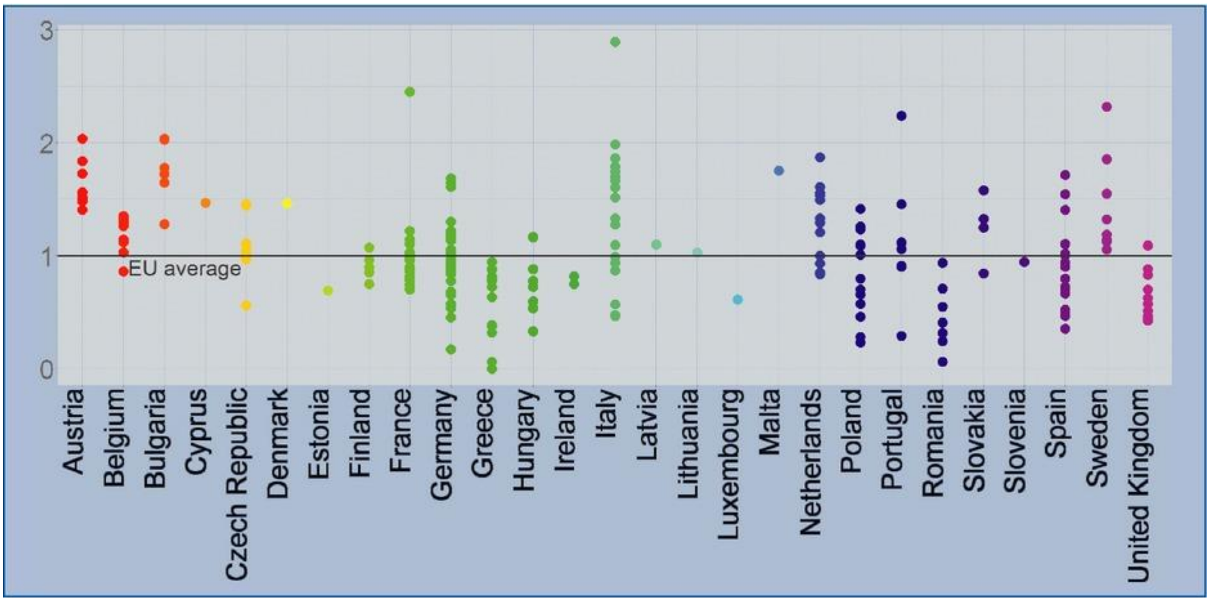
From the evidence provided by Wallenko et al. (2024) and Sands et al. (2011), it can be speculated that **rural areas with higher levels of employment and GVA rooted in the agri-food industry may be at a higher risk of being disproportionately impacted** compared to rural regions with lower levels of employment and GVA rooted in agri-food. Rural areas in countries such as Lithuania, Latvia, Bulgaria and Romania could therefore potentially experience disproportionate impacts compared to rural areas in Member States such as Ireland, Belgium, and Denmark due to their higher levels of employment and GVA rooted in agriculture (see Figures 4 and 12 in Annex II). However, other countries, such as France, Spain, Denmark, and the Netherlands have large livestock sectors, which are a large contributor to rural economies. Indeed, countries with export-oriented agri-food markets, such as Ireland, the Netherlands, France, Germany, Spain, Italy, and Denmark, may face reduced competitiveness globally if prices of EU exports rise, thus potentially impacting rural areas.

GDP/capita losses are expected to be higher for Central and Eastern European (CEE) Member States compared with Western Member States under carbon pricing for agriculture scenarios (Orecchia & Parrado, 2014).[28] CEE Member States with higher rates of poverty in rural areas may face additional burdens as farms, particularly small farms, typically have less access to capital for adopting low-emissive practices, combined with larger proportions of rural areas employed in agriculture. For the on-farm ETS, de minimis thresholds to exclude small farms could mitigate such negative impacts in rural regions with small semi-subsistence farms in Member States such as Bulgaria and Romania. However, for the four policy options in which farmers are the non-obligated entity, rural areas dominated by small farms with less collateral and capital, may be disadvantaged in being able to participate voluntarily in the generation of CRCF units. Many farmers in rural areas with higher rates of poverty are characterised by higher numbers of small farms, many of whom will lack the economies of scale to make initial

[28] Results are dependent on scenario assumptions. The authors analyse the impacts of extending the EU ETS1 to agricultural non-CO2 emissions. The authors distinguish two targets, a reduction by 20% and 30% compared with 1990 levels. Within each reduction target, they consider mitigation through a carbon tax levied on non-CO2 emissions. Under the 20% target, the carbon price is expected to be between $18.8 to $16.3 per tonne of CO2: in this scenario the GDP goes down by 0.25% in Western Europe and by 0.87% in Eastern Europe. Under the 30% reduction target, the price ranges from $49.1 to 41.4 per tonne of CO2: under this scenario, the GDP in Western Europe goes down by 0.62% and 2.05%

investments in climate-friendly practices (Trinomics, 2023). Unable to make such initial investments could create inequalities of opportunities for new business opportunities in rural areas.

Figure 1: Distribution of regional abatement costs per tonne of CO2eq grouped by EU Member States[29][30]



It can also be speculated that potential impacts on rural economies across the EU will vary based on marginal abatement costs – the financial costs associated with reducing GHGs and their abatement benefits. Overall, Austria, Netherlands, and Sweden are predicted to have higher abatement costs than the EU average, while Greece, Romania and Hungary are below the average, while some Member States demonstrate high variance in the spread of abatement costs, such as Italy, Poland, or Germany (Perez Dominguez & Fellman, 2015) – See Figure 1.[31]

Nevertheless, despite lower abatement costs, some of the Member States with higher levels of rural poverty, GVA in agriculture, and employment share in agriculture also **lag behind other rural regions in terms of technological adoption and infrastructure needed to reduce emissions** (Frelih-Larsen et al., 2024). If the policy options allow for combined contracts for food and carbon delivery, there are risks of downstream obligated entities changing suppliers to farms with the means to generate both food and carbon delivery, and thus disproportionately impact rural regions lacking the infrastructure to facilitate emission reductions.

3.3 Means of enhancing positive benefits and minimising potential negative impacts on economic activities in rural areas

As discussed in the previous input paper, one of the main advantages of the ETS options is the ability to generate revenue which can be utilised to minimise potentially negative social impacts. Indeed, the original exploratory study (Trinomics, 2023) highlights several existing studies demonstrating how negative social impacts from carbon pricing in agriculture can mitigated through revenue recycling (Nnoaham et al., 2009; Cavaillet, 2019; Darmon et al., 2024; Cleghorn et al., 2022; Roosen et al., 2022). Indeed, there is further evidence that such **transfers of revenue can enhance equality and cushion negative welfare effects for rural regions** as well (Feindt et al., 2021; Montenegro et al., 2019; Berry

[29] Figure from Perez Dominguez & Fellman (2015)
[30] The dots represent NUTs=2 regions grouped by Member State; values are normalised with respect to the EU27 average. Values above 1 imply higher abatement costs compared to the EU27 average and values below 1 imply lower costs than the EU27 average.
[31] Results are dependent on assumptions. Perez Dominguez & Fellman (2015) utilise data from Witzke et al. (2015) and Perez Dominguez et al. (2012) to provide varying estimates of marginal abatement costs. Perez Dominguez et al. (2012) develop 6 scenarios, and provide estimates for abatement costs for each scenario. Witzke et al. (2015) also provide 9 scenarios, providing estimates of abatement costs.

et al., 2019; Eisner et al., 2021). Eisner et al. (2021) test different transfer schemes, including flat cash transfers, geography-based transfers including differing amounts between urban and rural areas, household composition-based transfers, and target-based, wherein the amount depends on a further defined group at risk of negative impacts. The authors find that every type of transfer scheme is able to enhance equality and reduce negative social welfare effects. While income-based transfers decrease regressive effects of carbon pricing, more vulnerable groups are often undercompensated (Kirchner et al., 2019; Beck et al., 2015, Carl & Fedor, 2016). Thus, transfer schemes focussing on particularly vulnerable groups or rural regions with higher risks demonstrate the strongest impacts in terms of equality, proportionality of cost burden and welfare (Eisner et al., 2021). Thus, a social climate fund, similar to the EU Social Climate Fund which has been established to help mitigate the social and economic impacts of ETS2, is a mechanism which could be introduced with the two ETS options. However, feasibility of such transfers should be taken into consideration, as to whether Member States' tax benefit systems distinguish between rural and urban householders which can compensate them in a direct manner (Callan, 2009).

For the ETS policy options, again the free allocation of allowances can play a role in rural regions at risk of being disproportionately affected. For example, under ETS1, the free allocation of allowances is distributed with mechanisms that indirectly benefit countries with lower GDP/capita due to their economic and energy profiles. While the distribution is not explicitly tailored for specific regions, it is instead governed by rules that consider factors such as carbon leakage risks, GDP per capita, and historic emissions. A key exception (Article 10c Derogation) **allowed lower-income Member States, with a GDP/capita below 60% of the EU average, to allocate free allowances** to their power sectors instead of auctioning them. The derogation was specifically designed to help lower income countries modernise their electricity systems and reduce their reliance on coal. To access these allowances, there are requirements Member States must invest the value of the allowances into modernising their infrastructure and prioritise renewable energy, energy efficiency and grid development. Both the on-farm and processor ETS options could implement similar derogations, allowing for Member States to invest in mitigation technologies and needed infrastructure to assist with reducing agricultural emissions.

The ETS1 also transitioned to phasing down the number of free allocations, but phased-in a **solidarity mechanism**, which **redistributed 10% of auctioning revenue to lower-income Member States** to partially offset the reduction in free allowances. In addition, revenues from the ETS options could be utilised to address impacts on rural areas with lower GDP/capita and higher levels of employment in agriculture. The **Modernisation Fund**, which is financed through the auctioning of 2% of total EU ETS allowances, is a financial mechanism under the ETS designed to support lower-income Member States in transitioning to a low-carbon economy by helping to modernise energy systems, improve energy efficiency and support the transition away from fossil fuels. Similar to the Article 10c derogation, Member States with a GDP per capita below 60% of the EU average specifically benefit from the fund.

As discussed above, there may be barriers for farmers with limited upfront resources to participate in the generation of CRCF units for the MCS policy options. However, the CRCF does include a provision to enable small farms to participate effectively through **group certification** and collective action. Under this provision, aggregators or cooperatives may act on behalf of small farms, wherein a group of farmers may collectively apply for certification under a single project, pooling their resources and efforts. The group as a whole is assessed for compliance with certification requirements, thus reducing costs associated with market entry. Another consideration to reduce potential inequalities of participation across rural areas in the EU could be **differentiated financial conditions** under forward contracts or feed-in-tariffs for small and medium sized farms in rural regions that are identified as being at a higher disadvantage. This could involve a higher up-front renumeration[32] (as a %) to cover potential costs for market entry barriers – while the total compensation for all farms would be the same, farms at higher

[32] Note that under the CRCF, land managers do not necessarily receive 100% of the payment of a CRCF unit up front to ensure permanence and accountability, and a proportion of the payment may be held as a reserve fund, which is released after a set period.

risk of entry barriers could receive a larger percent of the initial payment. Alternatively, financial assistance with transactions for small and medium farmers from rural regions at risk could be provided through the centralised pool.

For both the MCS and ETS policy options, **separate targets for removals could potentially be a means to reduce the risks of potential land speculation** by large corporations or investors of small and medium farms without generational succession. By capping the amount of removals that can be traded within either types of policy options, limitations could be set on the amount of afforestation credits that are allowed to be utilised for compliance.

As was identified above, EU funding programmes have demonstrated positive impacts on reducing income, poverty, and employment gaps between urban and rural areas. Thus, relevant funding opportunities for rural regions that may be potentially at a disadvantage under the policy options needs to be considered for flanking policies. This warrants consideration of how funds from the European Structural and Investment Funds could contribute to the needs of such rural regions While flanking policies will be further discussed in depth in the following workshop ('Enabling'), we encourage stakeholders to begin considering different types of policy instruments, both existing and new, that could address the unique factors affecting economic activities in rural areas.

Discussion Questions

- For the ETS policy options: what design choices could mitigate the risks of distributional impacts on less advantaged rural regions? (for instance, the paper mentions free allocation of allowances or use of ETS revenues)
- For the MCS options: what approaches could enhance benefits and mitigate risks for small farmers in rural areas? (for instance, the paper mentions group-based certification and differentiated financial conditions)
- How can risks for small and medium farms without a successor be mitigated?
- To what extent could the need for developing new skills, along with enhanced business and technical advisory services under a new climate policy for agriculture, create employment opportunities and stimulate economic activity in rural areas? Which social groups are most likely to benefit from these developments?
- How can existing EU funds be utilised to support rural regions? What kinds of flanking policies could be implemented to support rural regions?

Section 4: Dietary choices and health

Dietary choices in the context of 2040 climate targets and food security

A recent definition developed by the High-Level Panel of Experts on Food Security highlights the multidimensional nature of food security. It is described as "a situation where all people, at all times, have physical, social, and economic access to sufficient, safe, and nutritious food that meets their dietary needs and preferences for an active and healthy life" (HLPE, 2020).

Several analyses demonstrate that additional climate and environmental policies targeting the agricultural sector do not have pose risks to food security; in fact, they can strengthen the EU's self-sufficiency while addressing the environmental drivers of food insecurity. A scenario developed by Agora Agriculture (2024) indicates that a policy aimed at reducing emissions from agriculture and agricultural peatlands by up to 60% by 2045 could be accompanied by stable or even increased self-sufficiency rates for key food products by mid-century, while meeting nutritional needs, reducing diet-related diseases, and enhancing biomass production for the bioeconomy. The EU could become a net virtual land exporter, easing global land resource pressure and contributing to global food security – provided that EU demand for animal-based food products, feed, and other biomass is more sustainable than it is today.

This is further supported by the LIFE scenario modelling in the Commission's Impact Assessment of the 2040 climate target, which suggests that shifting away from high meat consumption and the related pressures on energy, water, and land resources can strengthen strategic autonomy in the food sector and enhance food security. At the same time, this shift could contribute to a 46% reduction in EU agricultural emissions by 2040 compared to 2015 levels.

Notably, the Commission's core scenario also demonstrates that achieving the proposed 90% net emission reduction target by 2040 does not necessarily require dietary shifts or changes in food demand profiles. Instead, it can be achieved through other pathways which prioritise the implementation of on-farm technological solutions, such as optimized feed efficiency, improved manure management, and others.

4.1: Overview of dietary habits and health-related impacts in the EU

The consumption of fruits and vegetables is a cornerstone of a healthy diet, with recognized benefits in mitigating the risks associated with non-communicable diseases, including cardiovascular diseases and cancer (WHO, 2019). Despite this, the dietary habits across EU Member States reveal a concerning deficit in fruit and vegetable intake. As highlighted by 2018 Eurostat data only 14.1% of European adults meet the WHO's recommendation of consuming at least five portions (400 g) of fruits and vegetables per day. This shortfall poses significant health risks, including obesity, which serves as a further risk factor for non-communicable diseases.

The disparities in fruits and vegetables consumption are marked across the EU, with variations by region, gender, and socioeconomic status. A survey-based study by Stea et al. (2020) revealed that participants in Southern and Northern Europe were more likely to consume fruit and vegetables compared to their counterparts in Eastern Europe. Additionally, gender and education were significant predictors, with females and individuals with higher education levels displaying greater adherence to recommended fruit and vegetables intake. Interestingly, the study also noted that in Eastern Europe, higher-educated females consumed more fruit and vegetables compared to their low-educated counterparts, whereas medium-educated males consumed fewer vegetables than their low-educated peers.

Socioeconomic inequalities play a crucial role in shaping dietary behaviours. Research has consistently shown an inverse association between socioeconomic status and fruit and vegetables consumption (e.g., Darmon & Drewnowski, 2008; Giskes et al., 2010). Factors such as income, education, and occupation influence dietary choices, reflecting broader structural inequalities. Financial constraints, physical accessibility, and perceptions of affordability act as mediators for these disparities. For instance, individuals in lower-income neighbourhoods face limited access to fresh produce and greater exposure to unhealthy food outlets (Andreyeva et al., 2010; Black et al., 2014).

The cost of a healthy diet is another significant barrier. While some settings demonstrate that nutritious diets can be achieved on low budgets (Tharrey et al., 2019), international data indicate that diets rich in F&V, such as the Mediterranean diet, are generally more expensive (Rao et al., 2013). This cost differential exacerbates socioeconomic disparities in diet quality, as lower-income groups are less able to afford healthier options (Pechey & Monsivais, 2016). These structural inequities reinforce the link between socioeconomic status and health outcomes, perpetuating a cycle of vulnerability to non-communicable diseases.

Overall, there are notable disparities in the affordability of healthy food across the EU. FAOSTAT provides country-level data on the cost of a healthy diet, defined as the minimum expense required to purchase the least expensive locally available foods that meet the dietary needs of a representative person, expressed in international dollars using purchasing power parity (PPP). Data for the EU-27 countries reveal significant variation, with the cost of a healthy diet ranging from 2.5 to 4.7 PPP dollars per person per day. EU-14 countries generally exhibit the lowest costs, although Greece is a notable exception. Conversely, EU-13 countries tend to have the highest costs for healthy diets. For instance, in countries such as Romania, Hungary, Malta, Croatia, Latvia, Poland, and Estonia, the cost of a healthy diet is more than 50% higher than in the EU-14 countries with the lowest costs such as Ireland and Belgium.

On the other hand, dietary habits in the EU reflect a significant reliance on animal protein, predominantly sourced from meat and dairy products. While globally the majority of dietary protein (57%) is derived from plants, in Europe, protein intake has been dominated by animal sources since surpassing plant-based protein in the mid-1970s (ESRS, 2024; Bonnet et al., 2020). The ratio of recommended daily protein intake to actual consumption indicates global overconsumption, with Europe exceeding recommended levels by approximately one-third. Notably, overconsumption is also observed among children. Although these averages obscure regional differences, the evidence demonstrates that protein intake across Europe substantially exceeds dietary requirements, suggesting that concerns about European diets being protein deficient are unfounded.

On average, EU citizens consume more than twice the global mean for animal protein. In 2020, per capita meat consumption in the EU reached 69.5 kilograms, while milk consumption stood at 236 kilograms (EC, 2021). However, these figures mask significant disparities among Member States. For instance, annual per capita meat consumption ranges from 34 kilograms in Bulgaria to 62 kilograms in Luxembourg, and milk consumption varies from 115 kilograms in Cyprus to 353 kilograms in Finland. Regional trends also highlight dietary shifts, such as reduced meat consumption in Italy, Germany, and Belgium since 2011, alongside a broader transition from red meat to poultry in several Member States (Pushkarev, 2021).

Elevated meat and dairy consumption can have significant health implications, particularly due to excessive intakes of saturated fats and red meat, which often exceed recommended guidelines. These dietary patterns are linked to an increased risk of non-communicable diseases, including cardiovascular diseases and colorectal cancer. Cardiovascular diseases remain the leading cause of mortality in the WHO European region, accounting for app. 25% of total deaths, with stroke contributing an additional 15% (WHO, 2008). Additionally, diets high in red meat are strongly associated with colorectal cancer, which, although less common than cardiovascular diseases, causes over 200,000 deaths annually in the region (Norat et al., 2002; Chan et al., 2011; Pan et al., 2012).

4.2: Potential policy outcomes for health

While the factors driving changes in consumer behaviour in the real world are nuanced and context-dependent, increased prices of livestock products due to mandatory climate standards or an ETS could incentivize consumers to shift toward consuming more plant-based products, and meat substitutes (Weishaupt et al., 2021). Since beef is more emissions-intensive, price increases for pork and poultry are expected to be less pronounced, potentially leading to a shift in consumption toward less emissions-intensive meat products as well (ibid.), thus reinforcing a trend that has already been observed in the EU over several years (Kanerva et al., 2013; EC, 2023).

Transitioning to diets with reduced meat and dairy intake holds significant potential for improving public health. A modelling study by Westhoek et al. (2014) suggests that replacing 25–50% of animal-based foods with plant-based alternatives could reduce saturated fat intake by up to 40%, aligning with the World Health Organization's recommended maximum dietary intake levels (WHO, 2003; WHO, 2011). The study assumed that reduced consumption of meat, dairy, and eggs would be offset by increased intake of cereals to maintain caloric balance and reductions in meat and dairy consumption were adjusted according to current consumption rates in different countries. Nations with low existing meat and dairy consumption were assumed to require smaller reductions, while larger reductions were modelled for others. The study concluded that such dietary changes could bring average red meat consumption closer to the levels recommended by the World Cancer Research Fund (approximately 70 grams per person per day), significantly reducing cardiovascular disease morbidity and mortality. Moreover, a reduced reliance on livestock production could indirectly improve public health by lowering antibiotic use and enhancing air and water quality (Marshall & Levy, 2011; Powlson et al., 2008; Moldanová et al., 2011).

While an overall rise in meat and dairy prices and the associated behavioural shifts could yield positive health outcomes for EU societies, cultural and demographic-specific impacts must also be considered.

Further research is needed to examine how price changes resulting from carbon pricing policies might influence consumption patterns across different socio-economic groups and regions.

Some studies argue that lower socio-economic groups, characterized by higher obesity prevalence and greater consumption of energy-dense foods, might experience substantial health benefits from dietary shifts (Nnoaham et al., 2009). However, other modelling exercises suggest that price policies alone may not effectively reduce nutritional inequalities due to varying food preferences and substitution patterns (Darmon et al., 2014). While pricing plays an important role in influencing consumer choices, a range of cultural, socioeconomic, and geographical variables also significantly affect these choices. Food consumption habits, types of food consumed, and methods of food preparation passed down through generations create cultural contexts that strongly influence consumer preferences (Prochazka et al., 2024). Studies exploring consumer behaviour in this area find that barriers to a stronger shift towards more plant-based diets include prevailing belief systems about the role of meat in human diets, perceptions of plant-based food inadequacy (Perez-Cueto et al., 2022), peer influence, and exposure through social media (McInnes et al., 2023), as well as sensory properties, convenience, product liking, and familiarity (Hoek et al., 2017; Banovic et al., 2022; Waehrens et al., 2023).

This raises the question of the food substitutions different socio-economic groups might choose when faced with rising livestock product prices. Fruits, vegetables, and derivative products (e.g. vegetable burgers), which would remain largely outside the scope of an emission reduction policy, would likely gain a relative cost advantage compared to other food categories. However, without additional interventions, consumers may opt for less healthy alternatives, such as energy-dense, nutrient-poor staples or sugary products. For instance, an increased reliance on pork-based products as a substitute for beef could elevate saturated fat consumption, leading to additional health concerns (Westhoek et al., 2011).

Consumers also have access to an expanding array of meat replacements and other plant-based alternatives, with plant-based meat and dairy products experiencing the highest growth within plant-based categories (Smart Protein Project, 2021). While there is a substantial body of research supporting the health benefits of plant-based whole foods such as whole grains, beans, and vegetables, studies examining the health impacts of plant-based meat alternatives remain limited (GFI, 2023). Plant-based meats, made from plant and fungal proteins, are often perceived as ultra-processed products by consumers (British Nutrition Foundation, 2025). However, this designation does not carry specific information on foods' nutritional profile (Chapman, 2024),and plant-based meats typically differ significantly from other ultra-processed foods in terms of nutrition, being low in sugar and saturated fat, and a good source of fiber. In fact, research has shown potential benefits from processing and fortification in plant-based meat products (Shaghaghian et al., 2022). While there is considerable variation among the available meat alternatives, recent studies suggest that replacing traditional meat with plant-based alternatives may help reduce the risk of heart disease (Gibbs and Gah-kai, 2023; Crimarco et al., 2020), improve gut health (Farsi et al., 2023; Toribio-Mateas et al., 2021), and support healthy weight management (Bottin et al., 2021).Flanking policies will be essential in ensuring beneficial dietary shifts. Interventions to address dietary inequalities could include subsidies for fruits and vegetables, targeted dietary awareness campaigns, and measures to promote healthy eating in institutional catering settings. Particular attention should be given to vulnerable population segments, such as pregnant and lactating women, children, adolescents, and the elderly (Oussalah et al., 2020), whose nutritional needs may differ significantly. In the context of carbon taxation on animal products, Springmann et al. (2016) emphasize that redirecting tax revenues to subsidize fruits and vegetables – while avoiding subsidies for energy-dense products – can optimize both climate and health outcomes. This insight applies to the possible use of revenues in the context of an ETS. If revenues were to be directed towards the consumer segment to mitigate impacts on vulnerable groups, health should be a key consideration in the design of the related solutions and avenues for redistribution.

Other policy measures could include value-added tax discounts on healthier products, which, though primarily implemented at the member-state level, could be facilitated by EU-wide guidelines. Public procurement also offers a powerful tool for fostering healthier food environments. By leveraging its substantial market share, the public sector can drive demand for sustainable and nutritious foods. Tailored EU-level procurement criteria could ensure that healthy and sustainable options become the default choice for all population segments. School meal programs in countries like Finland, Ireland, Latvia, and Sweden exemplify social policy measures that have successfully reduced socio-economic disparities in healthy eating (Grivins et al., 2018; Darmody, 2021).

Discussion Questions

- In your national context, do you anticipate that increasing prices of animal-based products, as a result of agricultural climate policy, would lead to pronounced health impacts on specific socio-economic groups?
- Do you see opportunities for the climate policy under consideration to incorporate incentives that enhance accessibility to products and ingredients that are both healthy and climate-friendly?

Section 5: Overview of our approach to assessing social impacts

For our study, the potential social impacts identified in this paper, as well as those identified in the fourth technical workshop, will be assessed qualitatively against a baseline scenario, which will also be developed qualitatively. The technical workshop on 'cohesion' provides an opportunity to qualitatively develop the baseline scenario as well as assess the expected social impacts that will result from each of the policy options. After the workshop, stakeholders will be asked to participate in a technical qualitative assessment, in which they are asked to submit a worksheet which contains a matrix of the potential impacts across the 5 policy options and their expected impacts on a list of indicators. A select group of stakeholders may be selected for a follow-up in-depth interview to discuss the results of their matrix. In addition to the stakeholder participants from the fourth workshop, we will also select key experts in relevant research areas to be consulted for both filling in the matrix, as well as to discuss their responses to the matrix for an in-depth interview. Interviews will be scheduled during the second half of February at each of the stakeholder's convenience. Experts will be contacted for interviews after the initial results from stakeholders have been collected and analysed – this will likely take place in April or May.

In order to ensure the comparability of results within the technical assessment, a qualitative scoring system will be adopted. This will assign a qualitative score for each key social impact for each of the five policy options that will be assessed. The scoring system will take into account both the "magnitude" of the social impacts and the "importance" of the social impacts. We will utilise a +/- system to assess to the "magnitude" of potential impacts of the policy options: +/- values will be given to ordinal categories ranging from "significant positive impact expected" = +++, to "no impact expected" = 0, to "significant negative impact expected" = --- (*see Table below for the +/- assessment categories)*;.

In order to have a full view of the policy options, fiches with relevant information summarising each of the policy options will be provided to stakeholders to assist them with the completion of the matrix across the options.

Social impact assessment – scoring system for assessing magnitude

	Social impact assessment - magnitude
+++	Likely very positive
++	Likely positive
+	Likely rather positive
0	Likely neutral
-	Likely rather negative
--	Likely negative

---	Likely very negative
(++)	Assessment uncertain
((--))	Assessment very uncertain

Stakeholders and experts will be asked to help build a baseline scenario primarily through trends which already exist or have already existed and their projection into the future (assuming no policy change). Stakeholders and experts will be asked to extrapolate from existing trends, to build a “most probably” scenario, so that the policy options can be contrasted with this scenario. To build an observation of trends, we will collect long-term information and data on the social impact indicators that will be assessed. We will also use a qualitative approach to build the baseline, in a similar manner to the impact assessment outlined above. We will utilise a +/- system to assess to the “expected trajectory” of key social factors: for magnitude, +/- values will be given to ordinal categories ranging from “very likely improving” = +++, to “no change in state expected” = 0, to “very likely deteriorating.” We will also take into account categories for uncertainty.

Social impact assessment – scoring system for building a baseline scenario

	Social impact assessment – baseline scenario
+++	Very likely improving
++	Likely improving
+	Likely rather improving
0	No change in state
-	Likely rather deteriorating
--	Likely deteriorating
---	Very likely deteriorating
(++)	Assessment uncertain
((--))	Assessment very uncertain

Once the both experts and stakeholders have completed the matrices of the social impacts using the +/- values, we will then assign numerical values to the ordinal categories for “expected trajectories.”. Once the categories are given numerical values, the expected trajectories will be computed by averaging the scores from the individual assessments. The initial results of the matrix scoring will be discussed with the fifth technical workshop participants. Answers from the in-depth interviews will help provide contextual justifications behind the scores. Results of both the matrices and interviews will be anonymised in the study.

Annex I: Structure of agricultural and food industries in EU Member States

Figure 1. Distribution of farms in EU Member States by size class (ha) (2020)

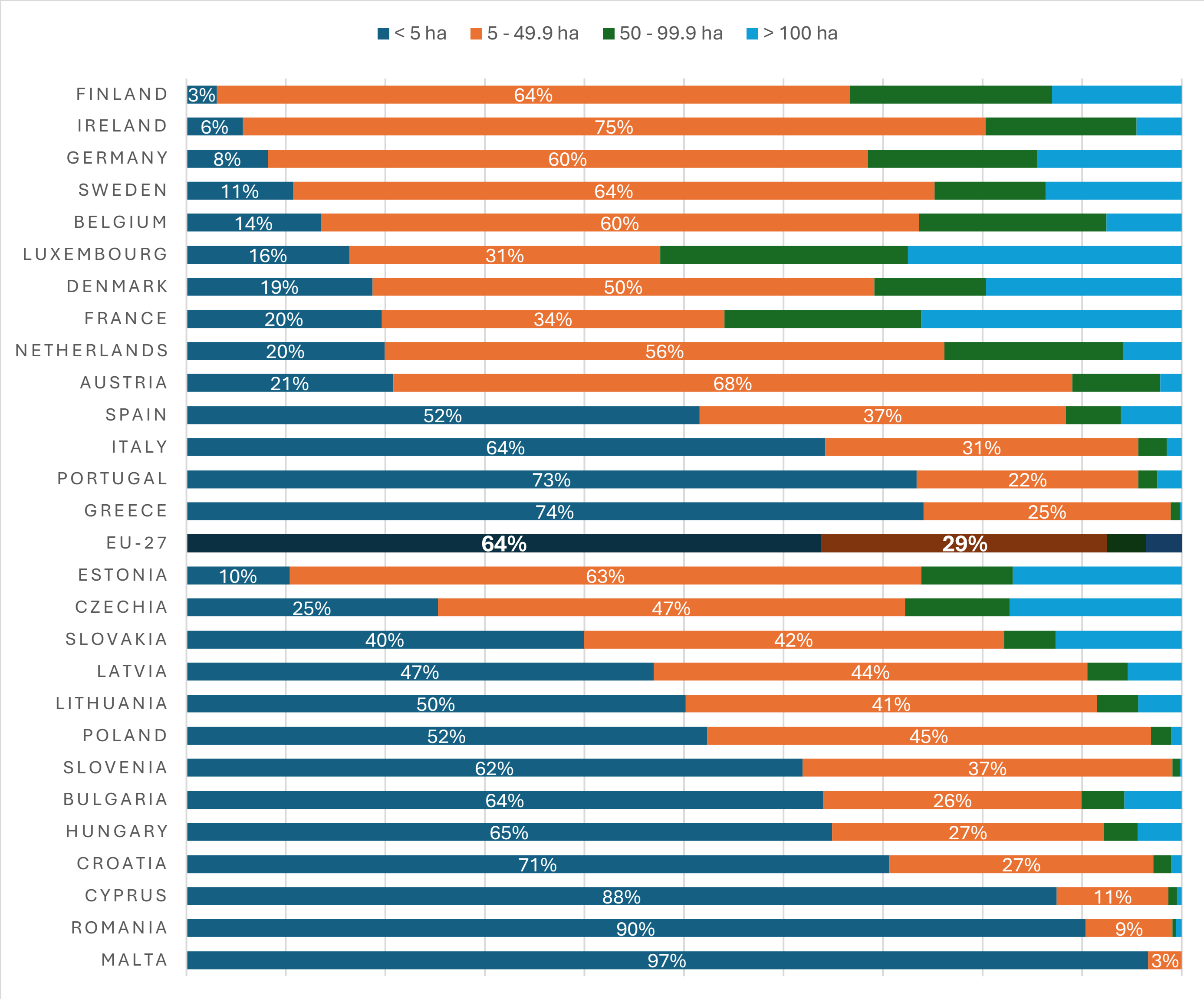
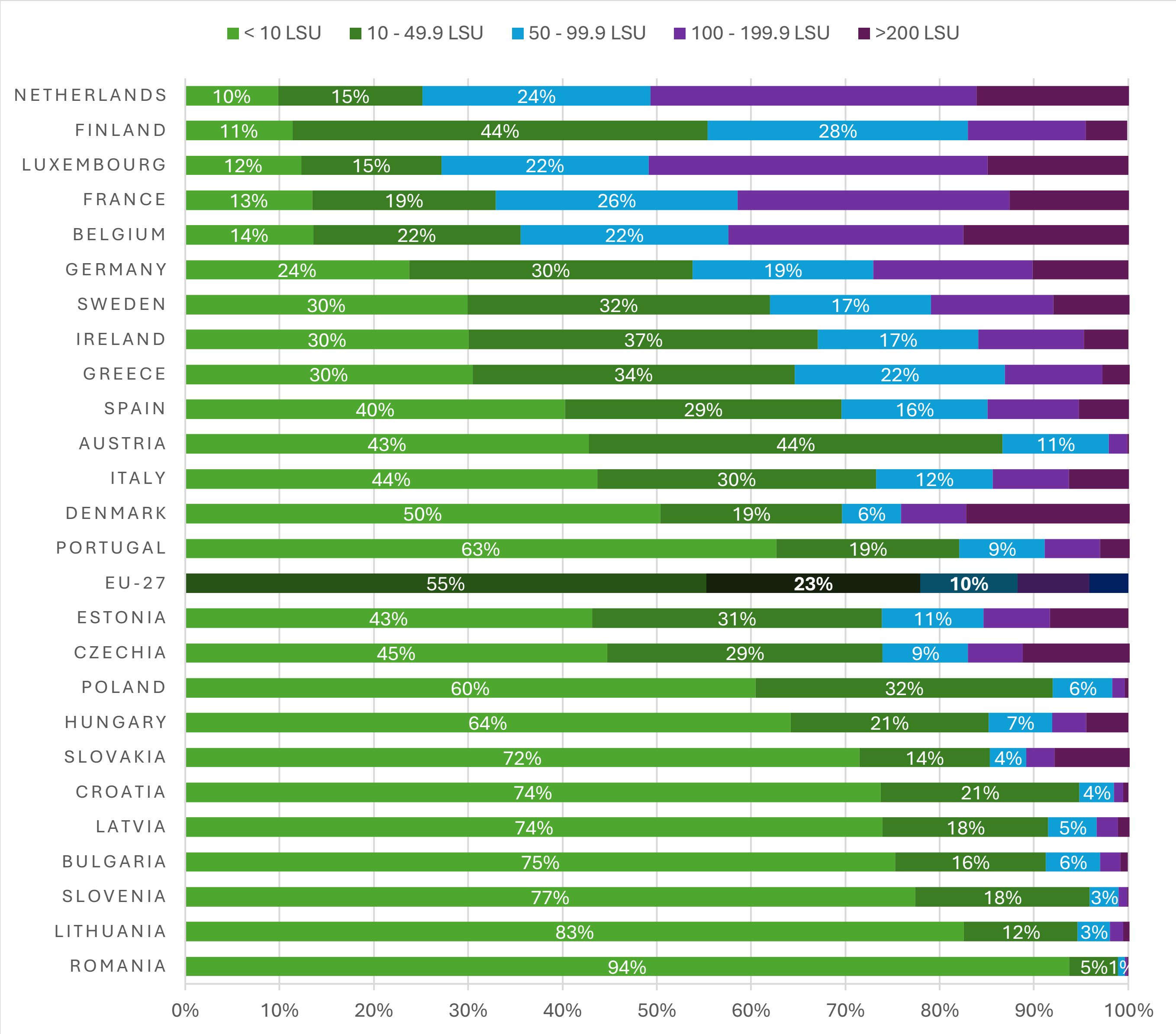
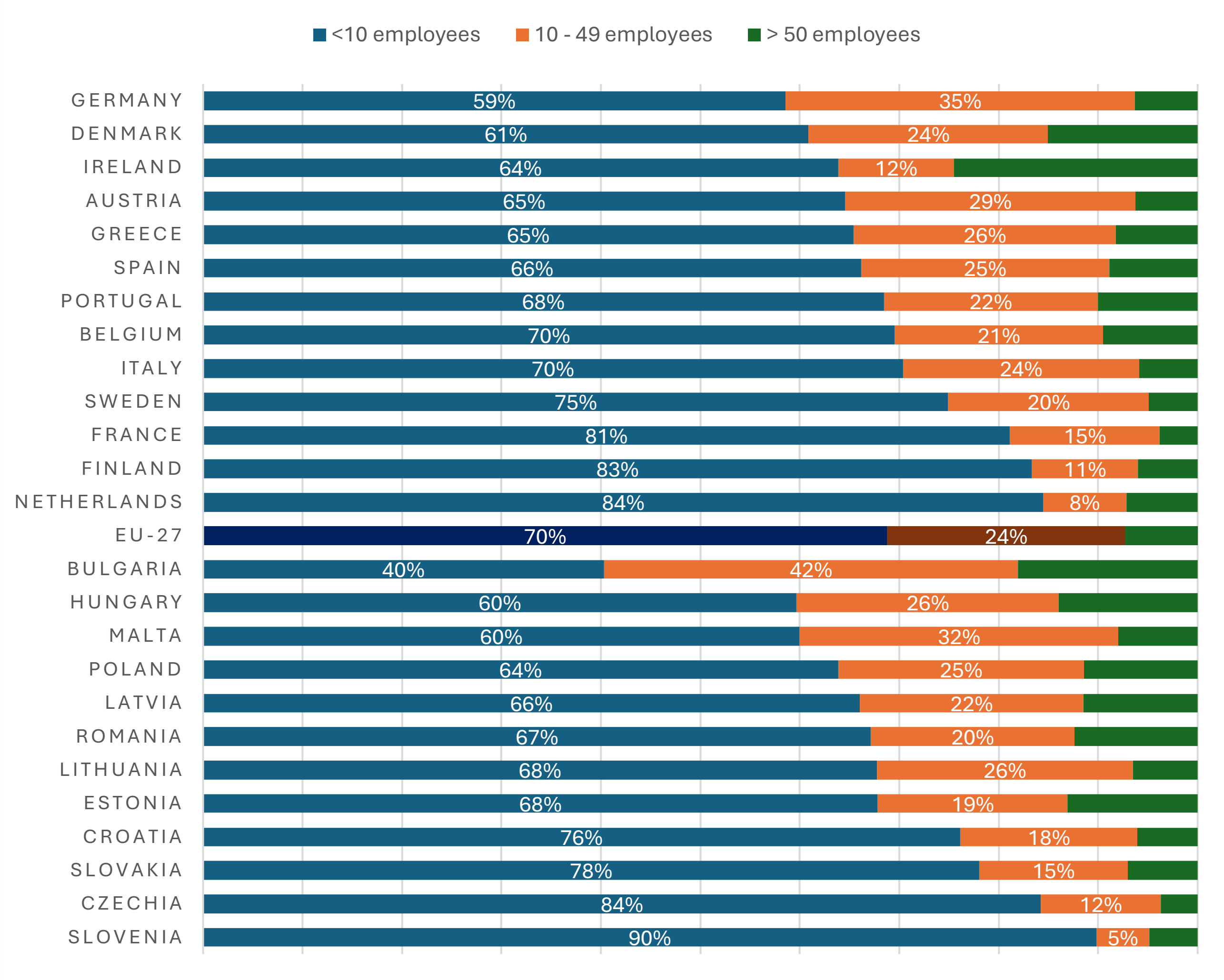


Figure 2. Distribution of farms in EU Member States[33] by size class (LSU) (2020)



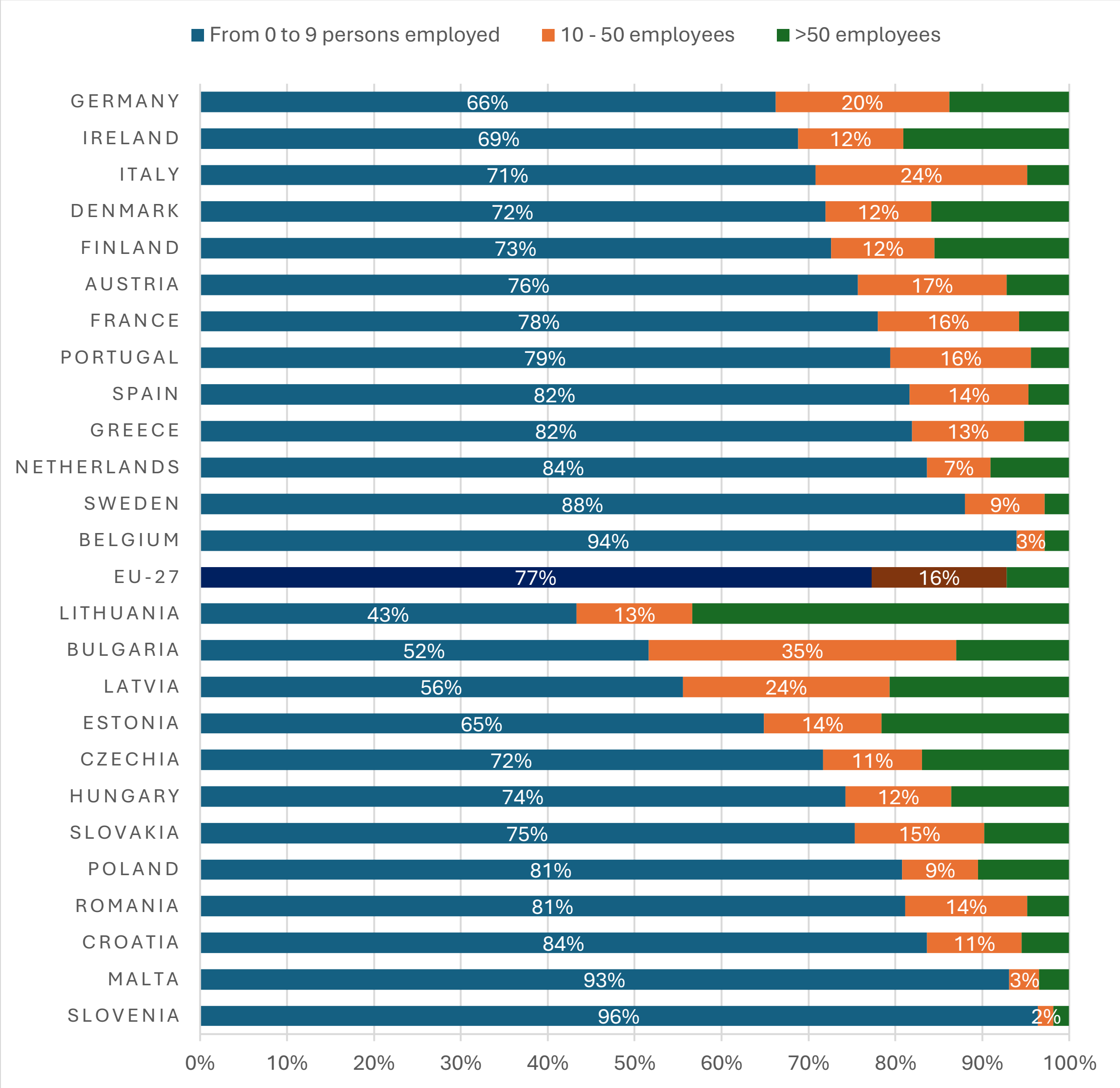
[33] The chart excludes Malta and Cyprus due to confidentiality issues and incomplete data. Both countries have very few farms—280 in Cyprus and 150 in Malta. However, it is notable that Cyprus diverges from the broader trend, with at least 120 farms exceeding 200 LSU.

Figure 3. Distribution of enterprises in national meat processing industries by size class[34] (2022)



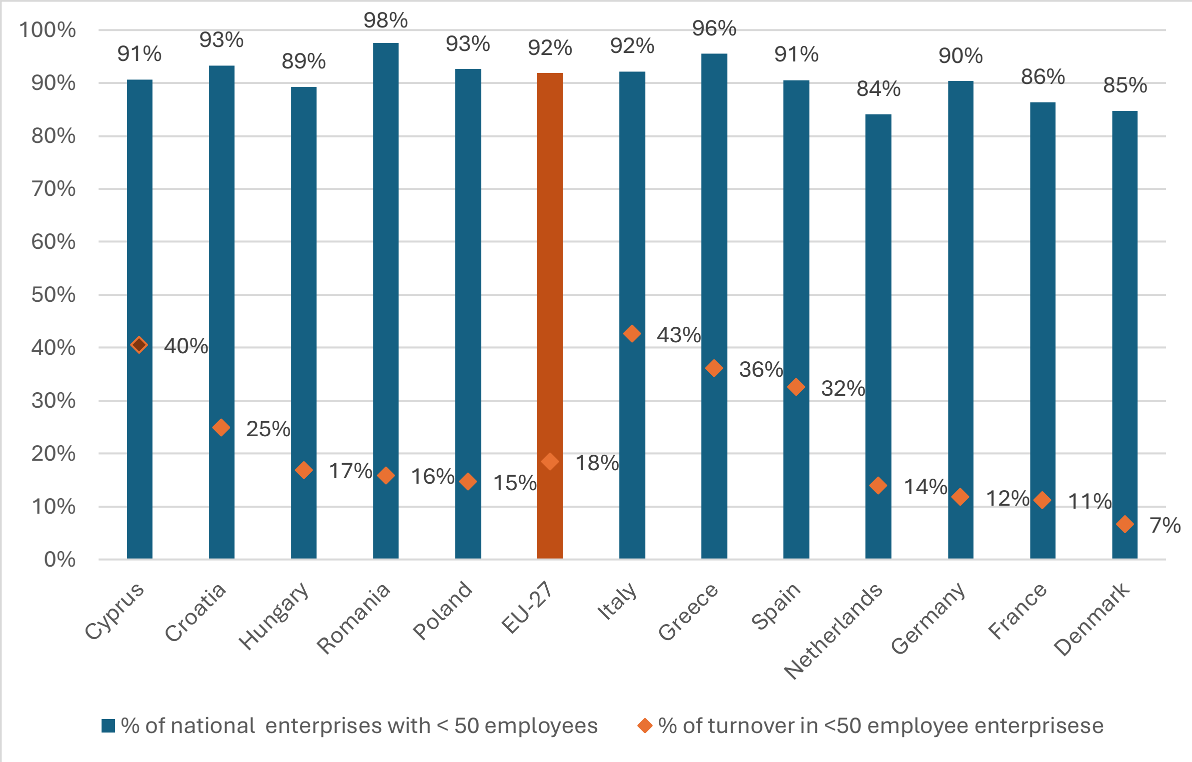
[34] Estonia, Cyprus, Luxembourg, and Malta are not included in the chart as parts of the data are undisclosed for confidentiality reasons. (Overall, these four countries have the smallest meat processing industries in the EU, with fewer than 100 enterprises at national level and less than EUR 450 mln in net turnover.)

Figure 4. Distribution of enterprises in national dairy manufacturing industries by size class[35] (2022)



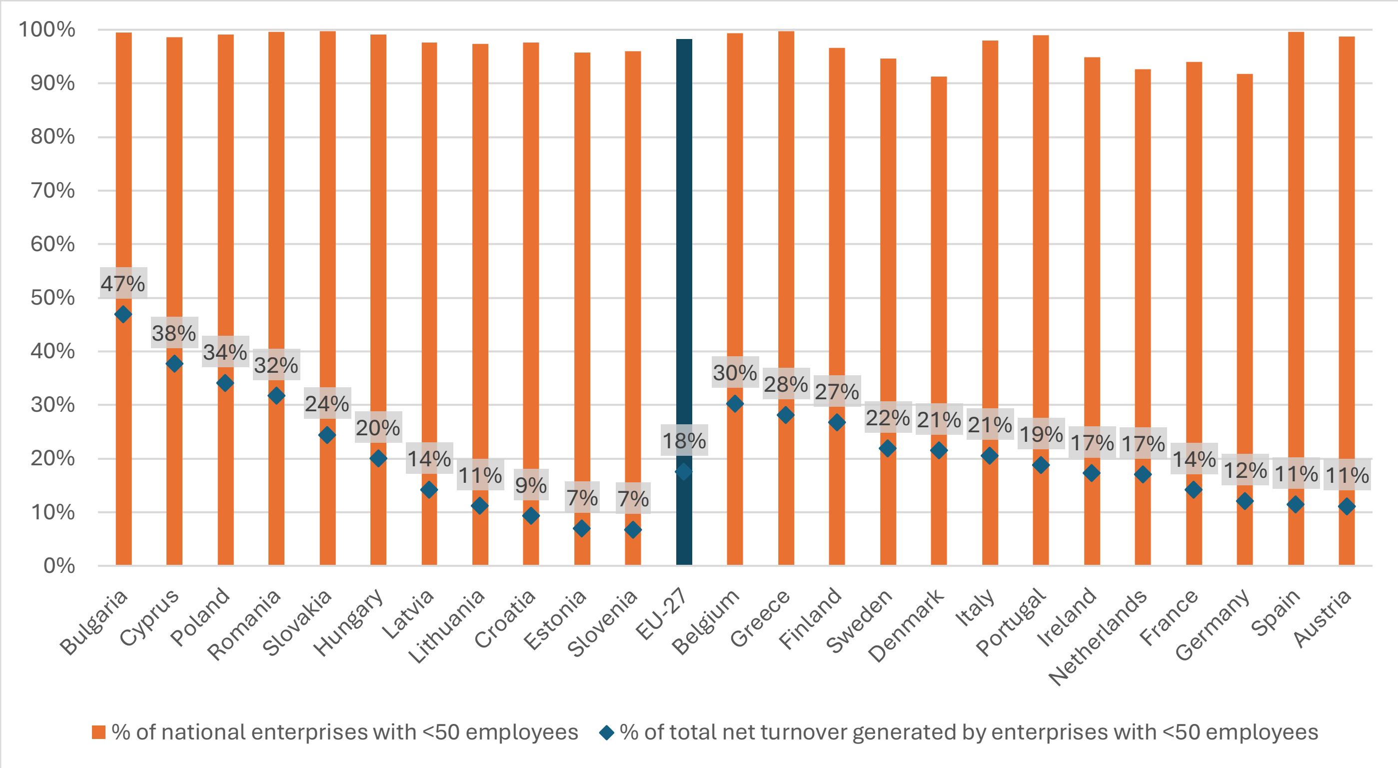
[35] Slovenia, Ireland, Denmark, Latvia, Malta, Estonia, Luxembourg, Croatia, and Cyprus are not included due to data unavailability for confidentiality reasons. The breakdown between <50 and >50 employees was chosen, as more granular categories would not allow for a meaningful analysis in several size class categories given the data restrictions.

Figure 5. Proportion of small enterprises and their share of total net turnover in the feed manufacturing industries of selected Member States[36] (2022)



[36] Belgium, Bulgaria, Estonia, Ireland, Latvia, Lithuania, Luxembourg, Malta, Austria, Portugal, Slovenia, Slovakia, Finland, Sweden have been excluded from the chart because of data availability restrictions.

Figure 6. Proportion of small enterprises and their share of total net turnover in the non-specialised retail industries of selected Member States[37] (2022)



Annex II: Trends of economic activities rural regions in the EU

Figure 1: GDP per capital in rural regions in the EU (2003 to 2020)

[37] Czechia, Malta and Luxembourg have been excluded from the analysis due to unreliability and confidentiality of national industry data.

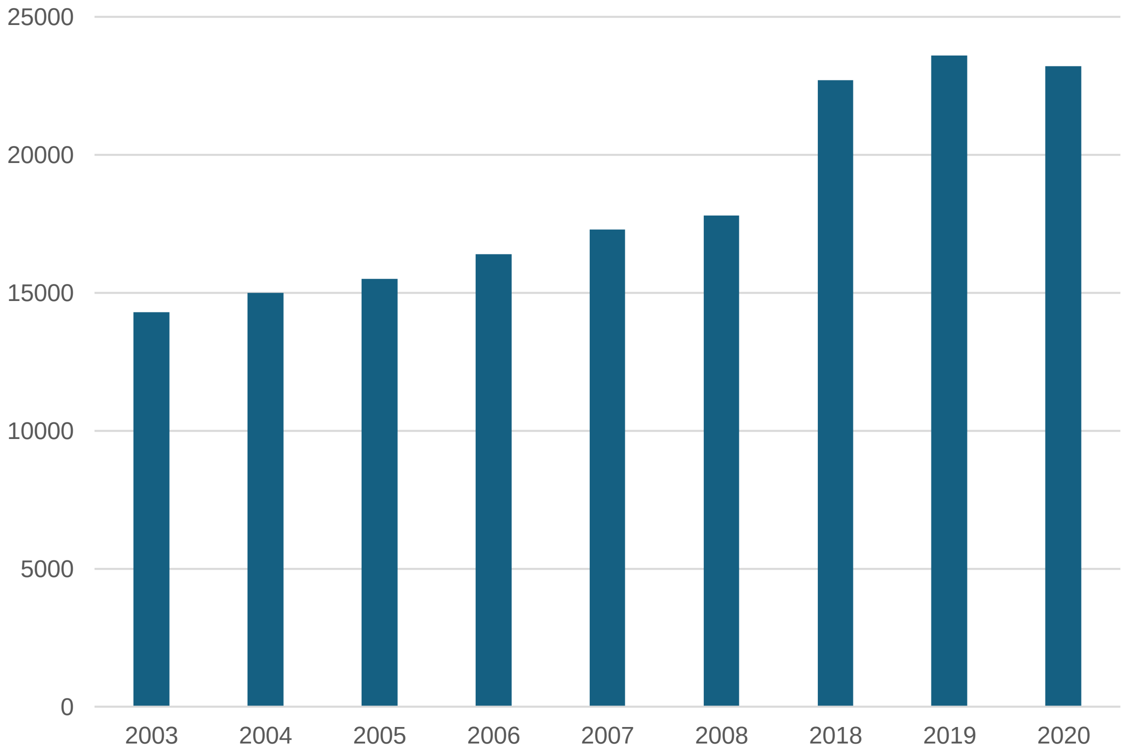


Figure 2: GDP per capital in rural regions in EU Member States (2010, 2020)

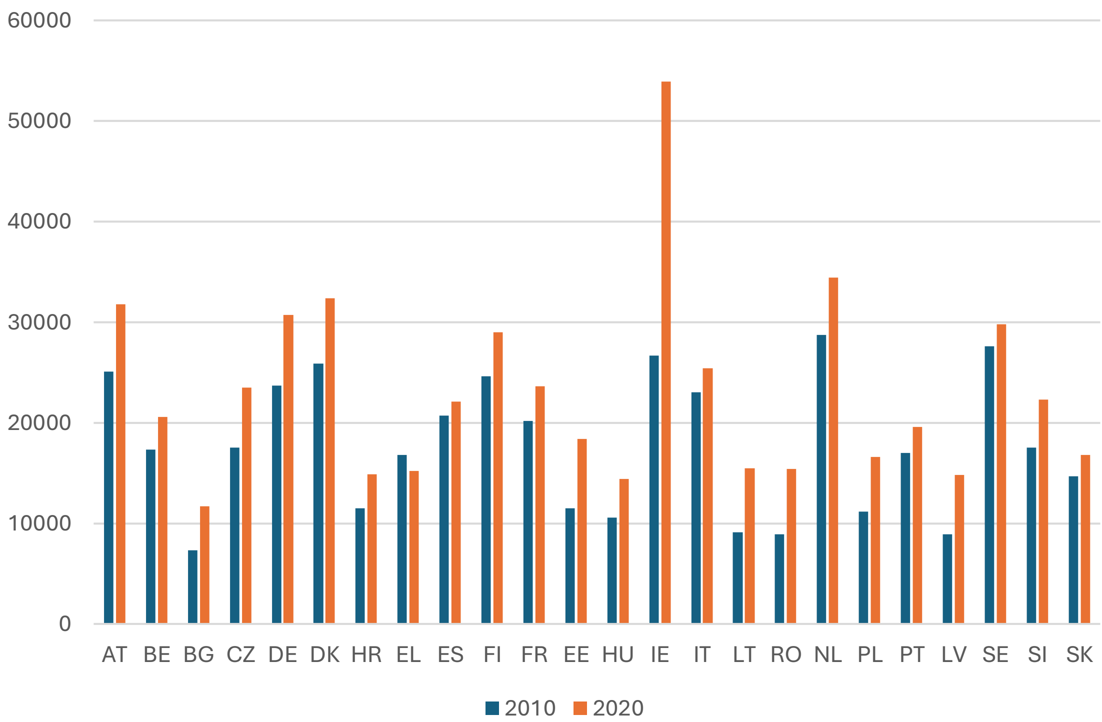


Figure 3: Gross Added Value for Selected Activities in the EU, by urban-rural topology (2021)

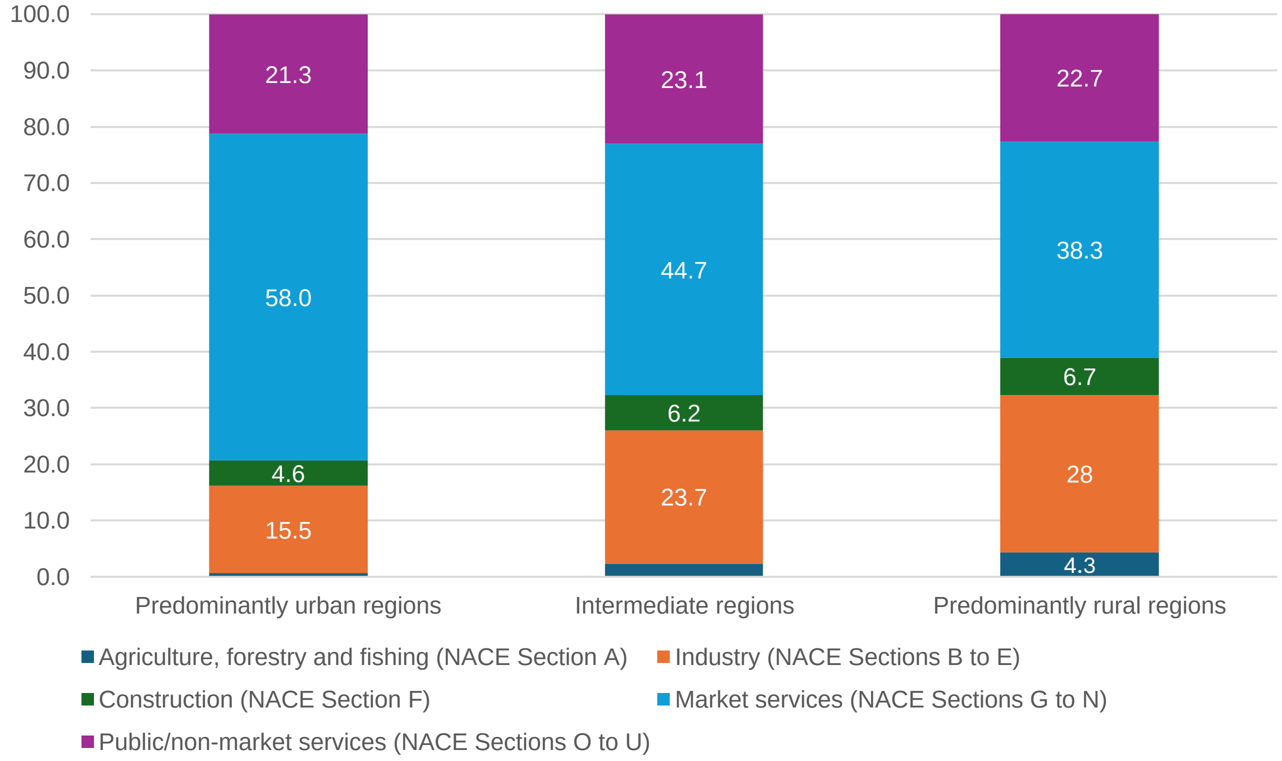


Figure 4: Gross Added Value for Selected Activities in EU Member States, by urban-rural topology (2021)

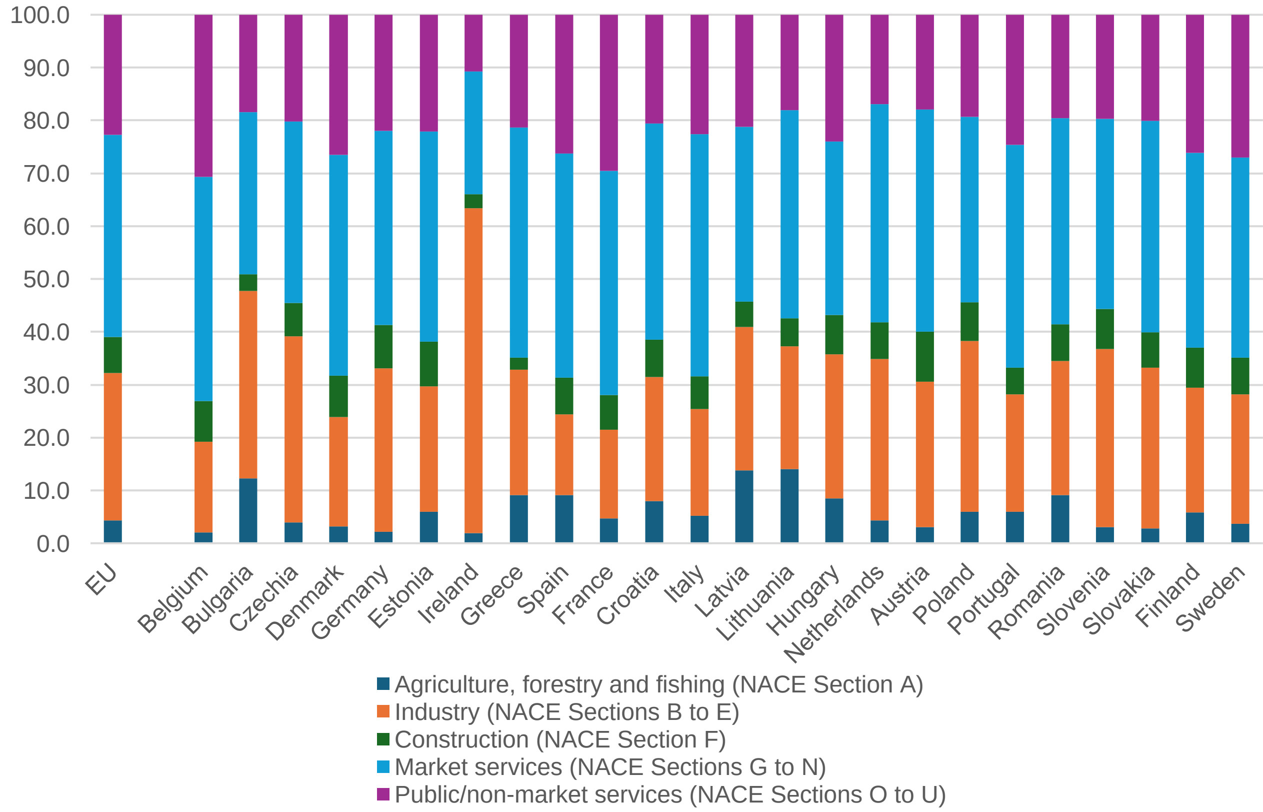


Figure 5: Poverty rates (%) in EU rural areas compared to total (2010 to 2020)

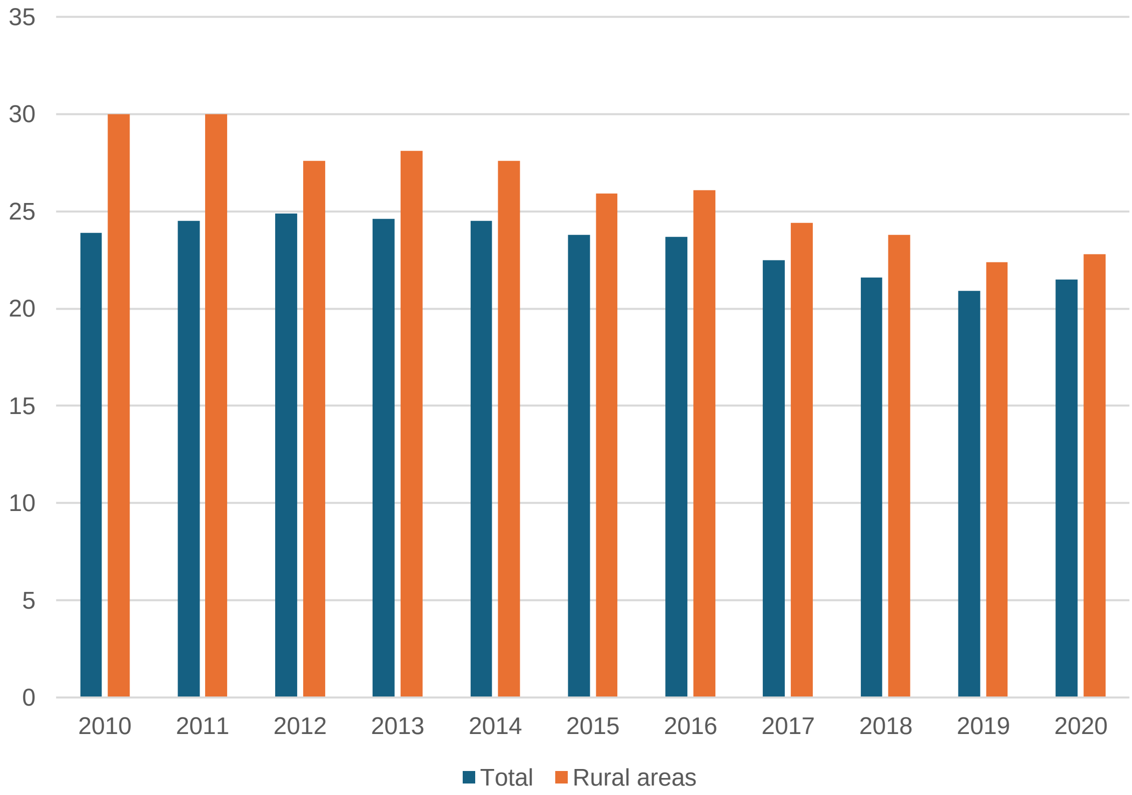


Figure: 6: Poverty rates (%) in EU Member State rural areas (2020, 2020)

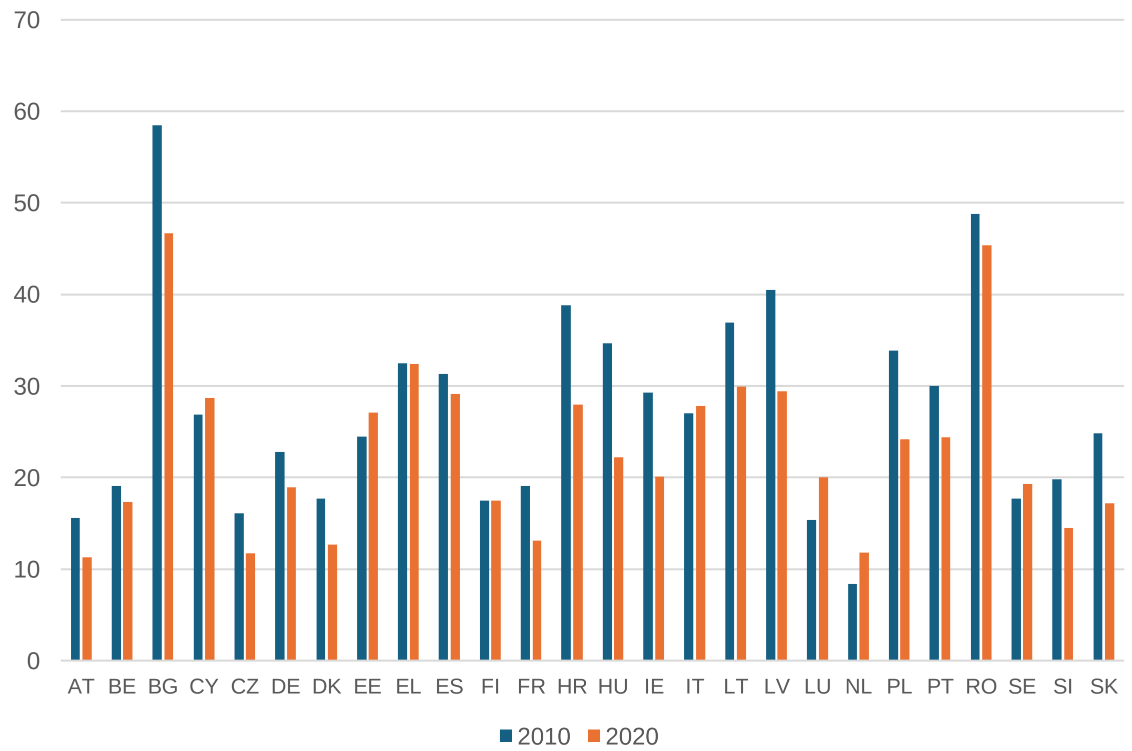


Figure 7: Unemployment rates (%) in EU Member State rural areas (2010, 2023)

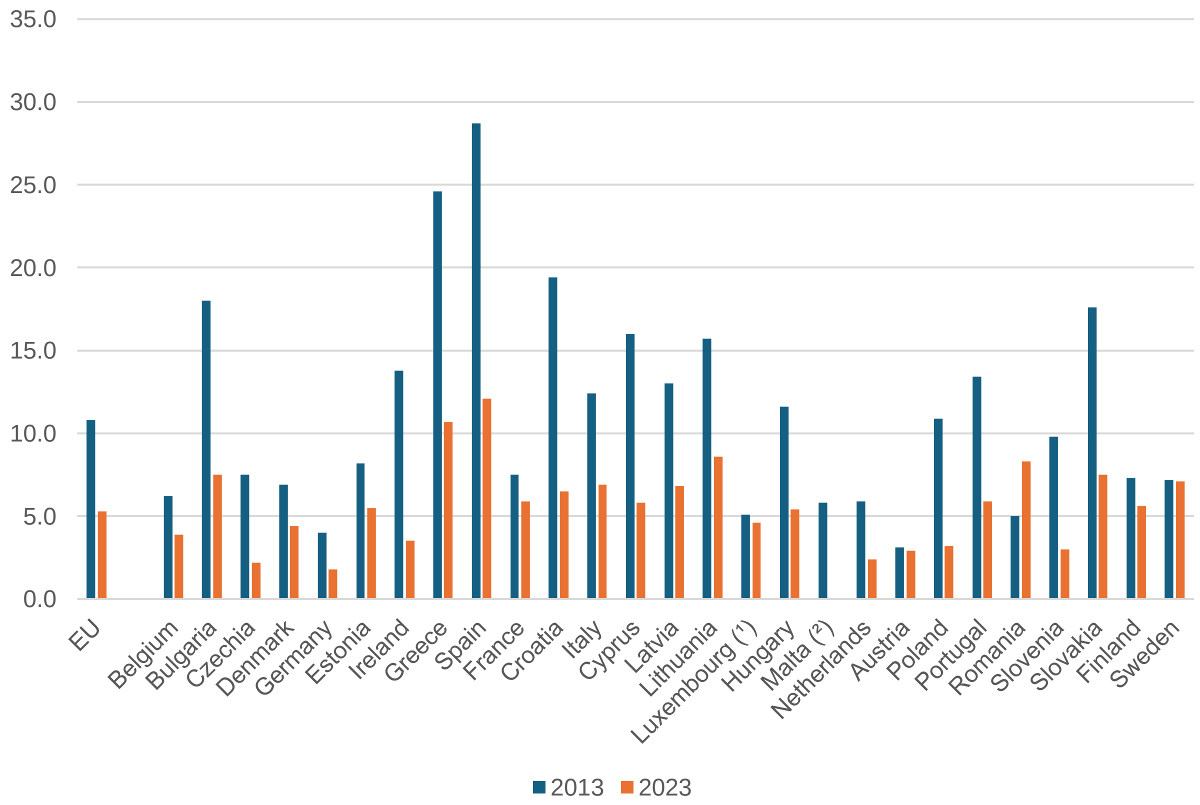


Figure 8: Unemployment in EU Member State urban and rural areas (2023)

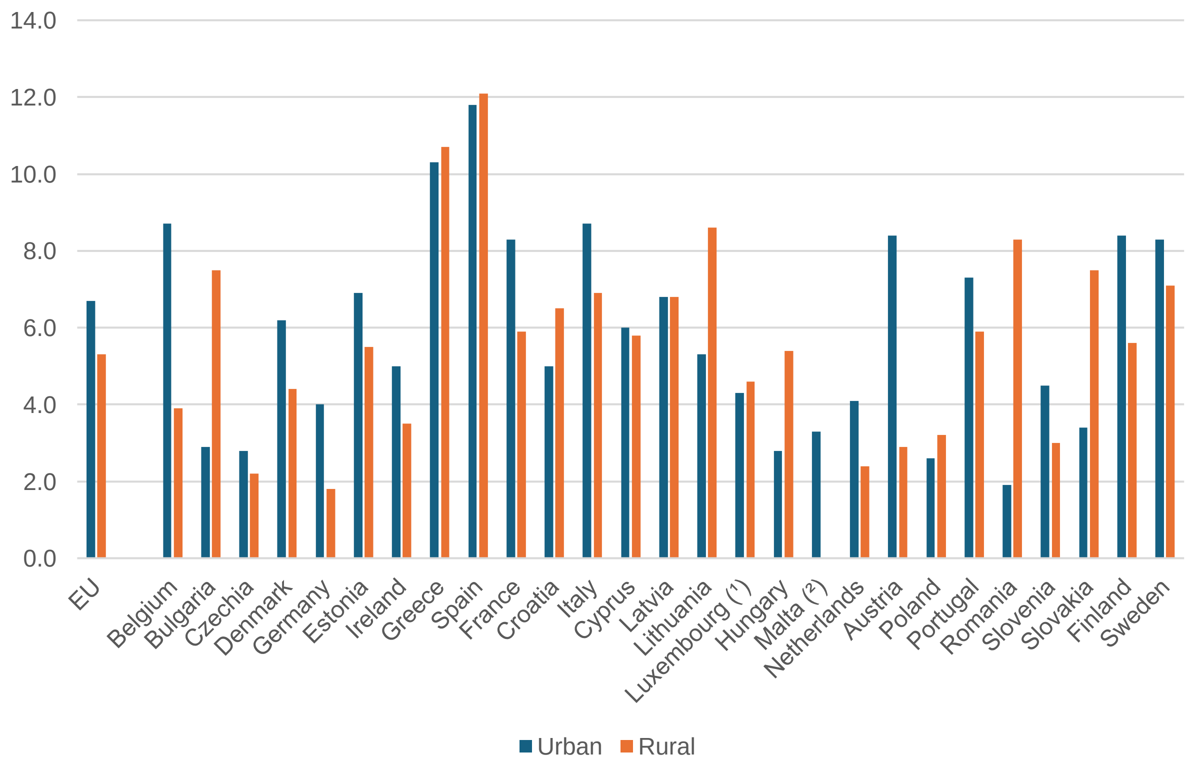


Figure 9: Youth unemployment in EU Member State urban and rural areas (2023)

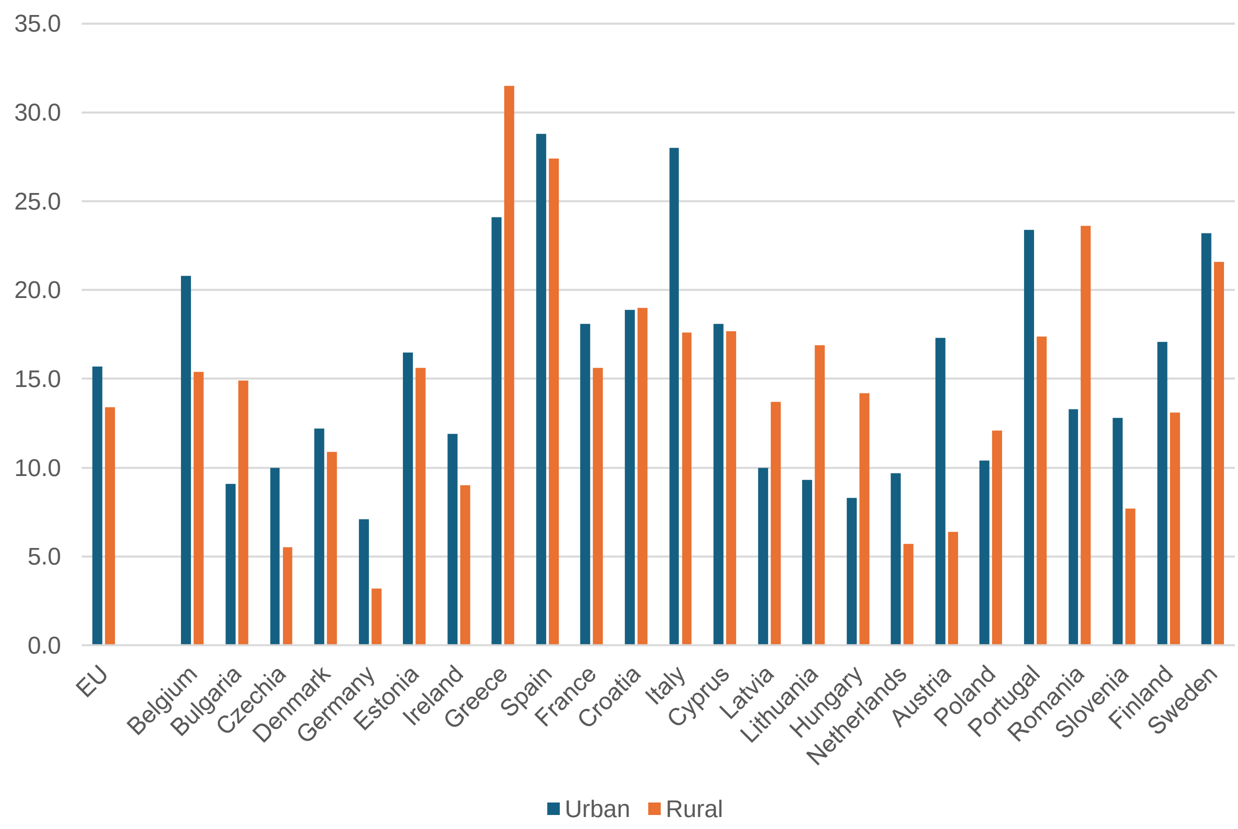


Figure 10: Employment for selected activities in EU rural areas (2021)

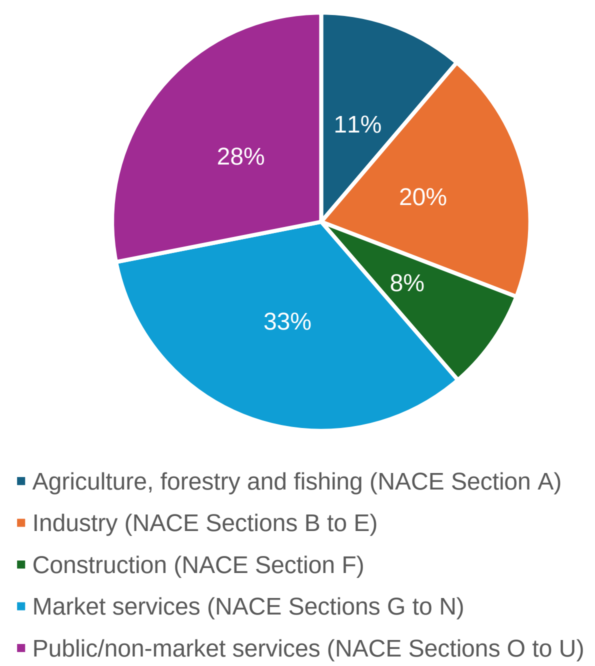


Figure 11: EU share of employment in agriculture, forestry, and food (2008 to 2022)

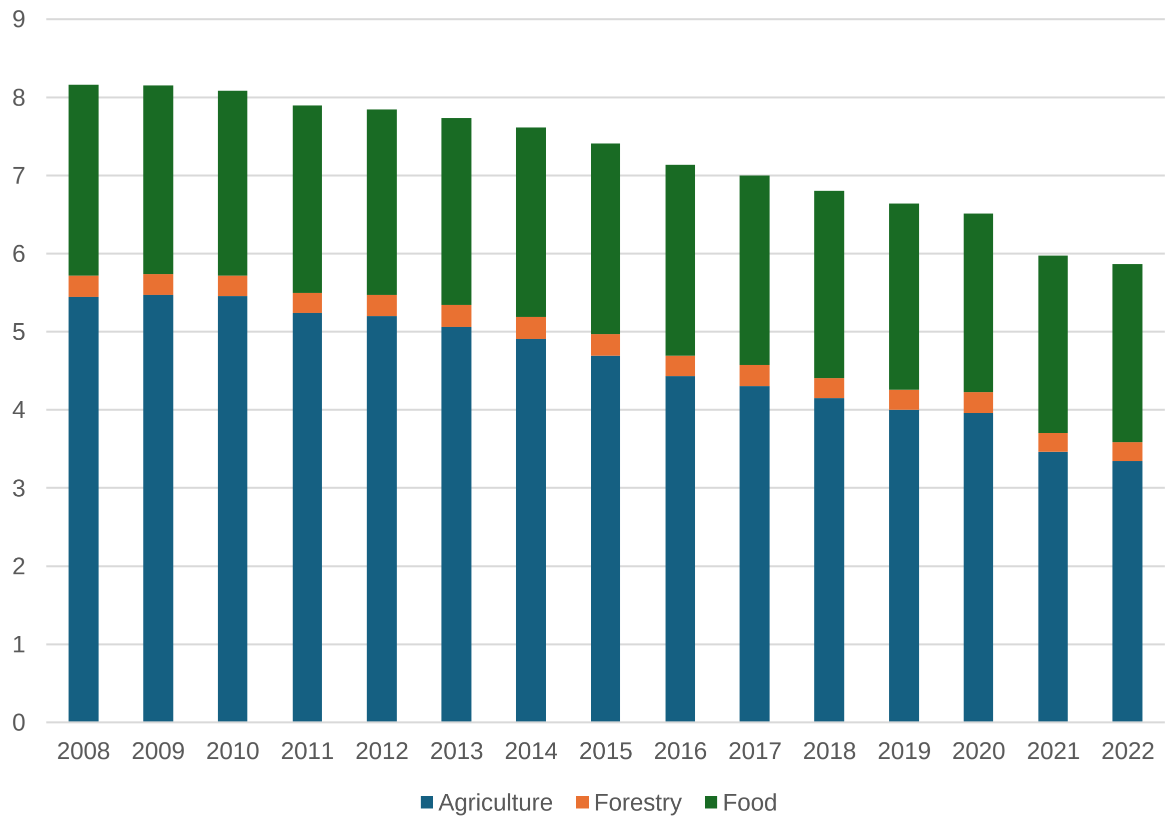


Figure 12: Share of agriculture in total employment in EU Member States (2010, 2020)

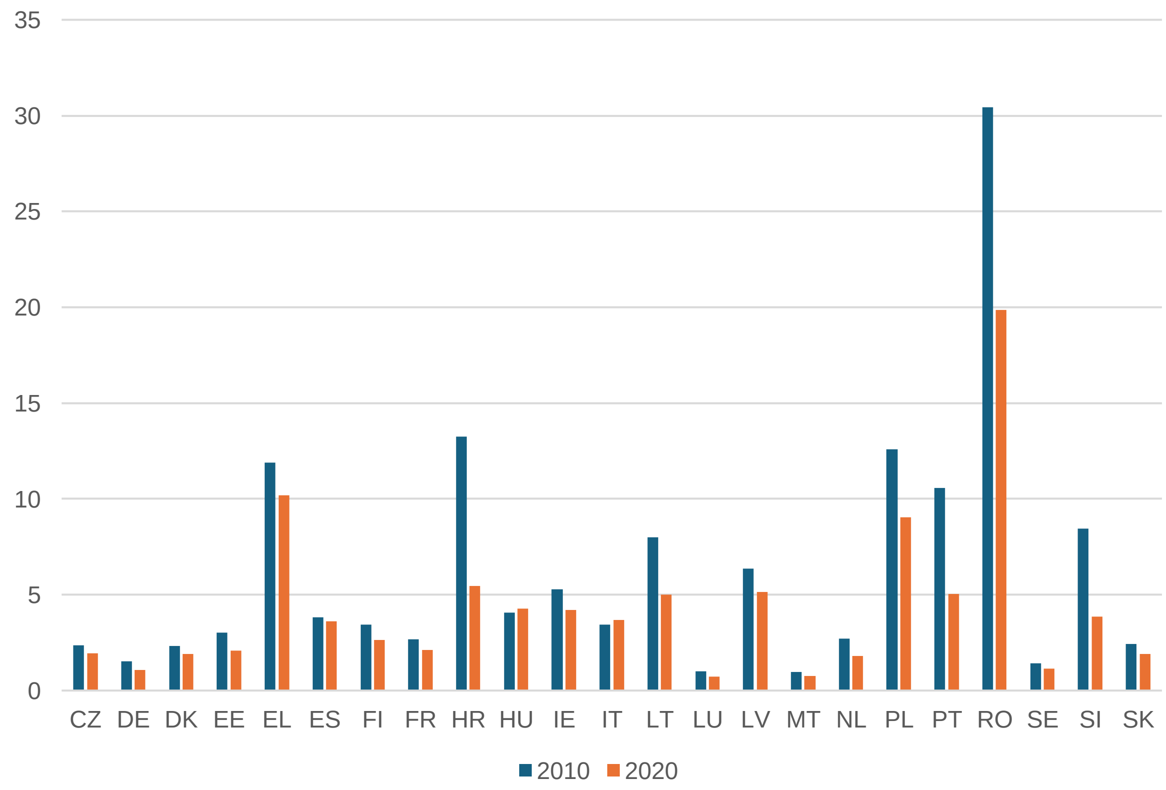


Figure 13: Distribution of EU farm managers by age (2020)

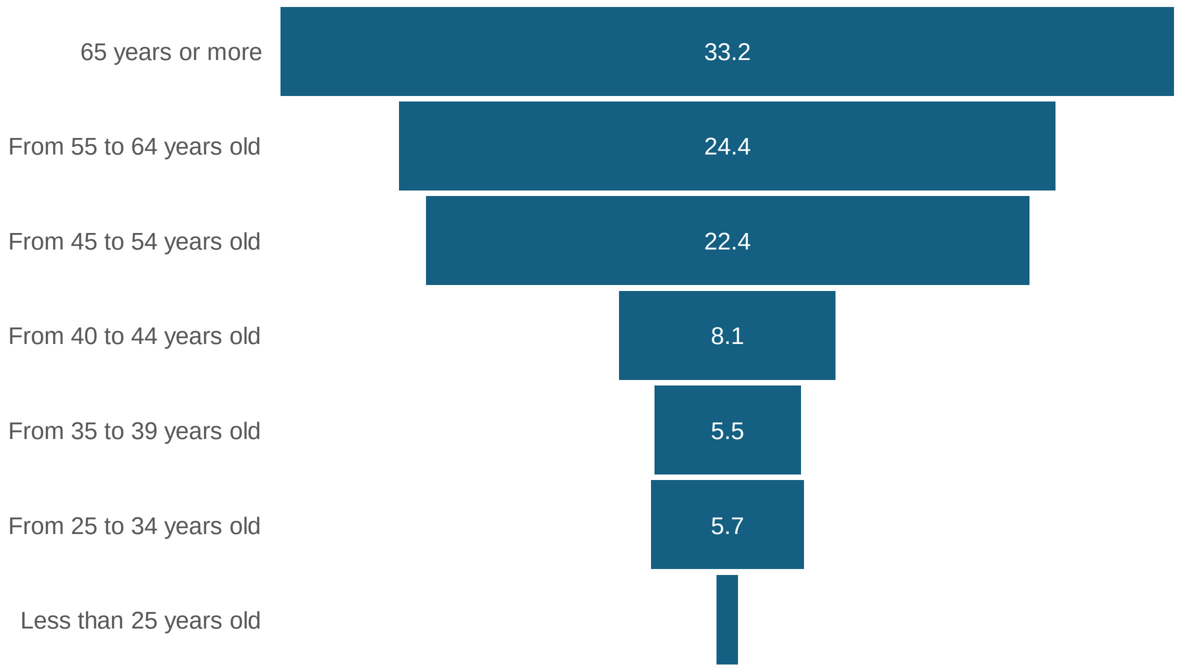


Figure 14: Distribution (%) of EU farm managers by age class and type of farm (2020)