



Climate Resilient Agriculture in Poland

Challenges, solutions and Polish-Dutch
cooperation opportunities

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We hope that the report will serve as a useful starting point for further dialogue, knowledge exchange, and the development of practical initiatives that translate existing expertise and technological innovation into tangible benefits for the agricultural sectors of both countries and beyond.

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Introduction

Climate change is one of the most significant threats to our quality of life. In a long-term global perspective it is possibly the gravest one. Its impact is felt in many areas of our lives but arguably, it affects the supply of agri-food products to the greatest extent. Rising temperatures, more frequent and prolonged droughts, water scarcity, heatwaves and extreme precipitation are already affecting agricultural production, while climate projections indicate that these pressures will intensify. The European Commission identifies climate change as the main driver of ongoing changes in European farming systems¹.

There is no doubt that risks to agricultural production posed by the climate crisis cannot be left unanswered. One path of action that we should pursue holistically across all sectors of the economy is climate crisis mitigation. This concerns limiting greenhouse gases emissions on a global scale. On the other hand, we can implement

adaptation measures, with much faster outcomes, implemented locally or regionally, without the need for global coordination. These solutions go beyond responding to individual extreme events and encompass changes in farm management, water and soil management, production technologies and the wider organisation of agricultural systems. In other words, increasing agriculture's climate-resilience is a complex and nuanced endeavour, dependent on specific circumstances and requirements. Taking all of this into account, a tailored approach seems quintessential for a successful climate adaptation of the agri-food sector. This report aims to provide insights on resilience building measures for the Polish agricultural sector.

Neutralising climate risks for the Polish agricultural production is a complex undertaking that combines systemic and technological changes. Starting from a blank slate seems counter-

intuitive in a world where a number of countries have already embarked on a journey towards a more resilient agriculture. The Netherlands provides a particularly relevant source of experience in this respect. Despite facing different climatic and geographical conditions, Dutch agriculture has developed advanced solutions for managing water scarcity and excess water, improving soil resilience, using water and other inputs more efficiently, and maintaining productive agriculture under increasingly variable weather conditions. Dutch policy and research approaches explicitly combine technological innovation with improved soil and water management, data-driven decision-making and cooperation between farmers, researchers, businesses and public authorities.

This report aims to facilitate the uptake of state-of-the-art Dutch solutions in Poland to strengthen the climate resilience and sustainability of the Polish agricultural sector.

¹ European Commission: Directorate-General for Agriculture and Rural Development and Oréade-Brèche, [Directorate-General for Agriculture and Rural Development, Oréade-Brèche], Changing agricultural and farming systems – Final report, Publications Office of the European Union, 2026, <https://data.europa.eu/doi/10.2762/5735340>

It identifies key challenges and needs affecting the sector, with a particular focus on areas where innovative technologies, knowledge and systemic practices can deliver the greatest impact. Based on these needs, the report proposes Dutch solutions and approaches that could be adapted and replicated in the Polish context. The objective is to identify opportunities that address Poland's agricultural challenges while creating mutually beneficial opportunities for Dutch companies to expand their technologies, expertise and business activities in the Polish market.

The report starts off with a short description of the interplay of agriculture and the crises our planet is currently facing. Though agri-food production is partially a culprit for the dire conditions we find ourselves in, it seems building its resilience can also result in climate mitigating effects. The next chapter narrows the perspective from a global one to the Polish context. It analyses the current state of agriculture production, resources, as well as the sector's development, barriers and needs. Building climate resilience could be greatly facilitated by appropriate governance of the process. Therefore, the next part

of the report takes on the dynamics among decision-making entities and the whole value chain. The overall climate crisis impact on Polish agriculture along with projected effects is described in detail in the next chapter. This forms the basis for analysing the potential avenues for achieving systemic, co-operative agricultural transformation in Poland. Building on this analysis this chapter also envisions a similar future for Europe. This future can materialize through using state-of-the-art systemic and technological solutions. The Netherlands is a global leader in this aspect, therefore the next chapter starts off with a short description of cooperation between Poland and the Netherlands. It then identifies the most important areas for building resilience of the Polish agricultural sector. These are: irrigation, renewable energy, controlled-environment technologies, sustainable dairy and poultry production, biogas plants and biorefineries, digital tools and precision agriculture, supporting services. Each subchapter provides rationale for the selection of these areas and their importance, as well as already developed and established Dutch solutions that could be replicated in Poland to build climate resilience.

The implementation of these measures could be greatly facilitated through financing and support measures described in the final chapter of the report.

The report once again confirms that the need for a timely climate adaptation is clear. The agri-food sector is one of the areas where this need is the most striking. It also argues that this objective could be achieved quicker and more efficiently through co-operation. The solutions are developed and tested, while the need for action is pressing. Let us not wait any longer and embark together on a journey towards more climate resilient agriculture!



1

Executive Summary

AGRICULTURE AND THE TRIPLE PLANETARY CRISIS

Agriculture is both a victim and a driver of the triple planetary crisis

The climate crisis, biodiversity loss and environmental pollution reinforce one another, so their combined effect on food and water security is **worse than the sum of the individual crises**. Rising temperatures can reduce crop yields by **up to 8% decline for every 1°C** of warming and nearly **50% of the world's cattle** may be exposed to dangerous heat by 2100. These adversities hit small-scale farmers and vulnerable rural communities hardest, which makes building resilience an imperative rather than an option.

At the same time, farming is a major source of pressure on the planet. Agrifood systems generate about **one-third of anthropogenic greenhouse gas emissions**, or 16.5 billion tonnes of CO₂ equivalent in 2023. Crop agriculture alone accounts for **72% of freshwater consumption** and **61% of nitrogen runoff pollution**, while crop and livestock farming together are responsible for **85% of biodiversity loss**.

Building resilience is a win-win: lower resource use means both adaptation and a smaller footprint

Reducing the amount of **energy, water and fertilisers** that farming requires prepares farms for the shocks caused by the polycrisis and, at the same time, limits the causes of those shocks. Sustainable agriculture concepts such as **agroecology, organic, regenerative and circular agriculture** use different tools, but they share one goal: balancing the use of resources so that production remains stable in the long term. State-of-the-art technologies, described in Annex A, can go further and turn agriculture from a source of environmental pressure into **part of the solution** to climate change, biodiversity loss, water scarcity and soil degradation.

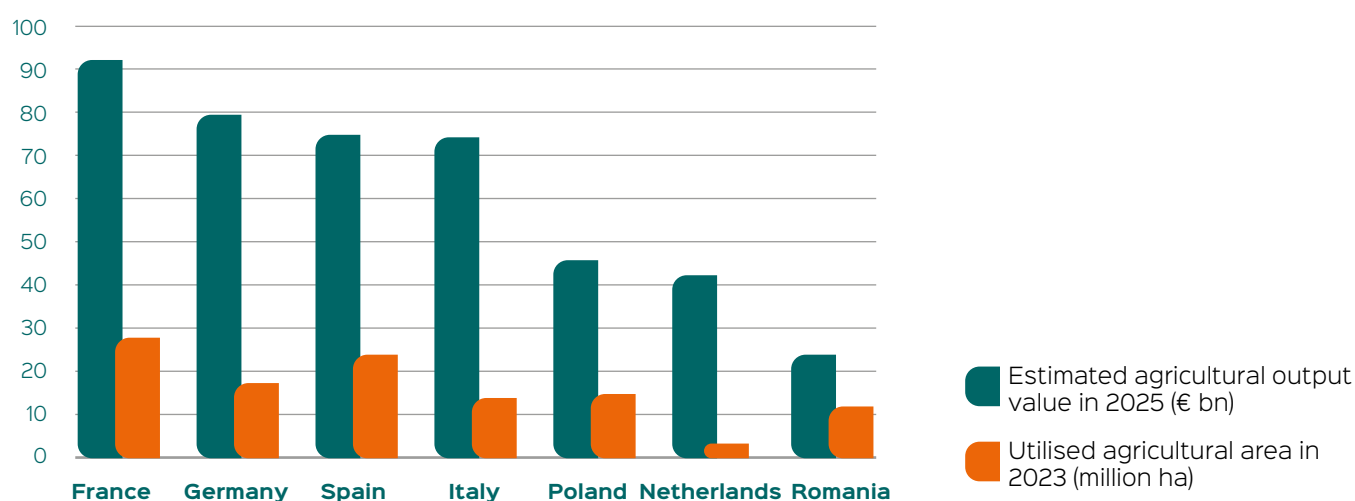
POLISH AGRICULTURE TODAY

Poland is an EU-scale agricultural producer, but output per hectare lags far behind the Netherlands

With agricultural output worth an estimated **EUR 45.5 billion in 2025**, Poland ranks **fifth in the European Union** and the sector still counts some **1.4 million farms**. Poland has about **eight times the agricultural area of the Netherlands** (14.6 million hectares compared with 1.8 million), yet the two countries generate a similar output value of EUR 45.5 billion and EUR 42.1 billion respectively. This productivity gap shows how much **Dutch technologies, expertise and production practices** could contribute to the efficiency of Polish agriculture.

The share of agriculture in Poland's GDP has fallen from close to 6% in the mid-1990s to about 2.5% in 2025, which is still well above the EU average of around 1.6%. The decline reflects the rapid growth of the rest of the economy rather than a weakening of farming itself. In 2025 the value of agricultural output rose by 15.2% and real farm income by 27.8%. The sector also remains a major employer, as Poland accounts for around **18% of EU agricultural labour on only 9.1% of the EU's agricultural land**.

FIGURE 1
Estimated agricultural output value, EU top 7, 2025 (EUR bn) and utilised agricultural area, 2023 (m ha)



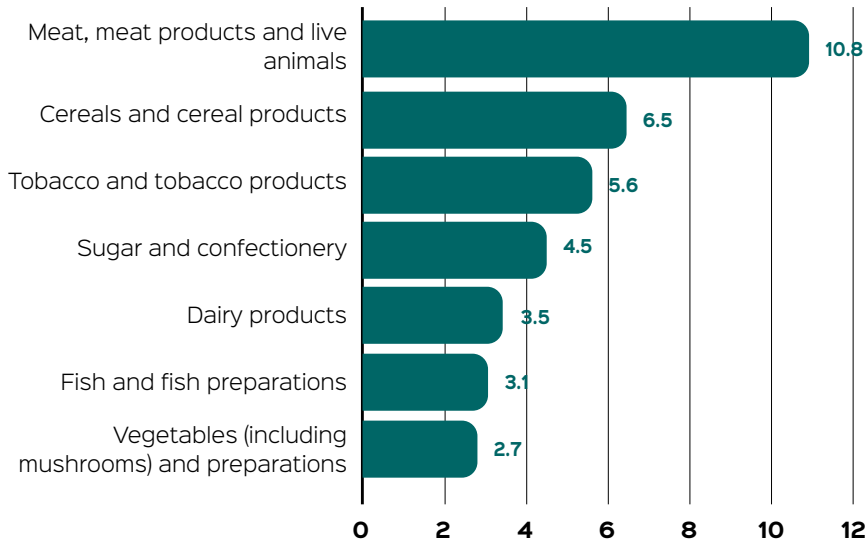
Source: Eurostat

Record agri-food exports depend heavily on climate-sensitive livestock production

Polish agri-food exports reached a record **EUR 53.5 billion in 2024**, against imports of EUR 35.6 billion, producing a **surplus of EUR 17.9 billion**. Around 74% of export revenue was earned on the EU single market, and Germany alone took more than a quarter of it. **Meat and live animals** form the largest export group: Poland is the **EU's largest poultry producer, with 21% of EU output**, and its third-largest milk producer. Animal products account for almost **63% of market agricultural output**, with livestock for slaughter alone representing 35.1%.

This export model is also a source of vulnerability. Poultry, pork and dairy are among the most climate-sensitive segments of agriculture, because **drought raises feed costs, animal production is water-intensive and heat waves reduce yields** while increasing mortality risk. Dependence on imported soybean meal additionally ties the most competitive livestock sectors to volatile global markets.

FIGURE 2
Structure of Polish agri-food exports, 2024 (EUR bn)



Source: KOWR

A large but uneven resource base: weak soils, cereal-dominated rotations and fragmented farms

Agricultural land covers almost **60% of Poland's territory**, so farming decisions shape the hydrological and ecological condition of most of the country. The difference of **more than 4 million hectares** between geodetic agricultural land (18.6 million ha) and the utilised agricultural area (14.6 million ha) represents a reserve that could be partly used for extensive production, agroforestry or water retention.

Cereals occupy 64% of the sown area, while grain legumes remain marginal, which perpetuates dependence on imported protein feed and increases exposure to spring rainfall deficits. The average farm has only **11.6 hectares**, ranging from 4.4 ha in Małopolskie to 33.5 ha in Zachodniopomorskie. Production is nevertheless highly polarised, as the **largest 10% of farms generate about half of agricultural output**. The 2024 season showed how exposed this resource base is: spring frosts cut the harvest of tree fruit by 14.4% and rapeseed fell by 12.6%, while spring-sown crops suffered from drought.



BOTTLENECKS, BARRIERS AND NEEDS

Six interlinked clusters of bottlenecks constrain climate resilience and are expected to intensify

The report identifies six clusters of bottlenecks that both shape and limit the capacity of Polish agriculture

to become climate-resilient. Because climate projections point to more frequent droughts, heat waves and extreme rainfall, these pressures are likely to grow rather than diminish.

Wielkopolska leads the country in producer cooperation thanks to its **larger, more specialised farms** and a deep tradition of rural self-organisation dating back to the 19th century. Świętokrzyskie, by contrast, has only a single producer group.

Weak cooperation matters for resilience because it forecloses precisely the **collective solutions** that would let small farms reach the scale adaptation requires, such as joint retention investments, machinery rings, shared storage and drying, common insurance and coordinated marketing.

FIGURE 3

Six clusters of bottlenecks in Polish agriculture and the corresponding needs

1

Soil quality and degradation

Only about **4%** of arable land belongs to the highest quality classes, while more than a third is weak or very weak. Around **60%** of agricultural land is acidic, lime use covers only a third of needs and about **86%** of peatlands have been drained.

Large-scale liming, rebuilding soil organic matter and paludiculture pilots are needed.

2

Drought, spring frost and floods

About **40%** of land is strongly exposed to drought and agricultural drought was confirmed in **2023, 2024 and 2025**, with losses of up to PLN 6.5 bn (EUR 1.49 bn) a year. Frost struck in three consecutive springs and **68 000 ha** were flooded in 2024.

Retention, efficient irrigation, frost protection and digital water management are needed.

3

Fragmentation, labour and succession

Agriculture employs about **8%** of the workforce but generates only **2.5%** of GDP, implying some **800 000** people in hidden unemployment. A lack of successors discourages long-term investment.

Land mobility, support for young farmers and shared access to technology are needed.

4

Weak producer cooperation

Only **641** producer groups operate in Poland (compared to 794 in 2025), about half of them in Wielkopolskie. The legacy of forced collectivisation still weakens trust, with dairy cooperatives as the main exception.

Revitalised cooperatives, water partnerships and contract farming are needed.

5

Economic and financial constraints

Real farm income fell in 2023–2024 after two record years, as grain stocks rose from **3.8 to 9.7 m t**. Insurance uptake is low and about **60%** of export value consists of low-processed products.

Risk-management tools, investment finance and higher-margin exports are needed.

6

Governance, knowledge and technology gaps

Competences for water and drought are **dispersed** across many bodies, monitoring tools are not integrated into farm decisions and digitalisation is concentrated in the **largest farms**.

Integrated governance, demonstration farms and data-driven advice are needed.

GOVERNANCE DYNAMICS AND KEY ACTORS

**Strong programming
and payment capacity,
but fragmented climate-
adaptation competences**

FIGURE 4
Multi-level governance of
Polish agriculture

EU level

*framework and
funding*

The **Common Agricultural Policy 2023–2027**, implemented through the national CAP Strategic Plan, sets the main framework, complemented by the **European Climate Law**, the EU Adaptation Strategy and the Biodiversity Strategy 2030. Since 2025 the **European Green Deal** agenda has been reframed around competitiveness through the Clean Industrial Deal and, for agri-food, the Vision for Agriculture and Food, which replaced the Farm to Fork Strategy.

Central level

*policy and
implementation*

Ministry of Agriculture and Rural Development (MRiRW) designs agricultural policy and manages the CAP Strategic Plan, while the **Ministry of Climate and Environment** leads on climate policy and **Wody Polskie** issues water permits and manages flood and drought risk. **Agriculture and Restructurisation and Modernisation Agency (ARiMR)** pays support to about 1.21 million farmers a year, **National Support Center for Agriculture (KOWR)** manages state land and markets, and institutes such as **Institute of Soil Science and Plant Cultivation State Research Institute (IUNG-PIB)** provide drought monitoring and scientific support.

Regional & local

*planning,
permits,
co-financing*

The **16 voivodeships** prepare regional strategies and programme a large share of EU funds, the **380 counties** handle selected permits and the land registry, and the **2 479 municipalities** decide on spatial planning and local permits while also benefiting from EU funds.

The central level combines strong programming and payment capacity with one structural weakness. Competences for water management and drought prevention are dispersed among several ministries, Wody Polskie, local governments and water partnerships and this fragmentation is the **single most important governance constraint** for climate-resilience policy. Because planning permission, environmental clearance, grid and water permits and EU co-financing may each be decided by **a different authority at a different level**, cooperation programmes should be designed to work across institutions rather than within them.

Internationally, Polish agricultural policy focuses on promoting exports under the “Poland tastes good” brand while defending domestic interests in EU negotiations. Its priorities include a ring-fenced CAP budget after 2027, safeguards on agricultural imports from Ukraine and opposition to the EU–Mercosur trade agreement. Poland voted against the Council decision to advance the agreement in January 2026. **The deliberate sourcing of foreign technology, capital and organisational models remains**

underdeveloped and bilateral initiatives such as the Polish–Dutch cooperation on soil quality and manure processing are still exceptions rather than a systematic policy.

Over EUR 100 billion of EU funds can finance the transition

EUR 25+ bn

CAP Strategic Plan
2023–2027
(EU share ~EUR 22 bn)

EUR 76.5 bn

Cohesion policy
2021–2027
(~EUR 17.9 bn for
renewables and circular
economy)

EUR 54.7 bn

National Recovery Plan
(KPO) – 40.3%
for the green transition

Since joining the EU in 2004, Poland has received EUR 245.5 billion gross from the EU budget, including around **EUR 67 billion for agriculture and rural areas**. Within the current CAP Strategic Plan, a redistributive payment of about **EUR 40 per hectare for the first 30 hectares** deliberately favours small and medium-sized farms. Whether this money translates into climate-resilient outcomes

depends on **coordination between levels of government and on local administrative capacity**. The priorities these funds finance closely match Dutch expertise in water management, horticulture, precision and circular agriculture and the bioeconomy.

The value chain is fragmented at the farm gate and concentrated downstream

Farmers are squeezed between rising costs and falling prices. Between May 2025 and May 2026 the prices of key inputs rose by about 7.3% while farm-gate prices fell by 15.3%, leaving the price-scissors index at **81.4**, one of the least favourable readings in many years. Public transfers already provide about **35% of the income of farming households**, and low profitability is the barrier to development that farmers themselves mention most often.

Downstream, bargaining power is concentrated. The food processing industry is fragmented, with no company holding more than 5% of the market, but food retail has become a loose oligopoly: **Biedronka's 2025 revenue of about PLN 108 billion (about EUR 25 billion)** exceeds that of Dino, Żabka and Carrefour Polska combined. Retailers increasingly set climate and sustainability requirements for their suppliers, which can either drive or constrain climate-resilient practices on farms.

CLIMATE CHANGE INFLUENCE ON POLISH AGRICULTURE

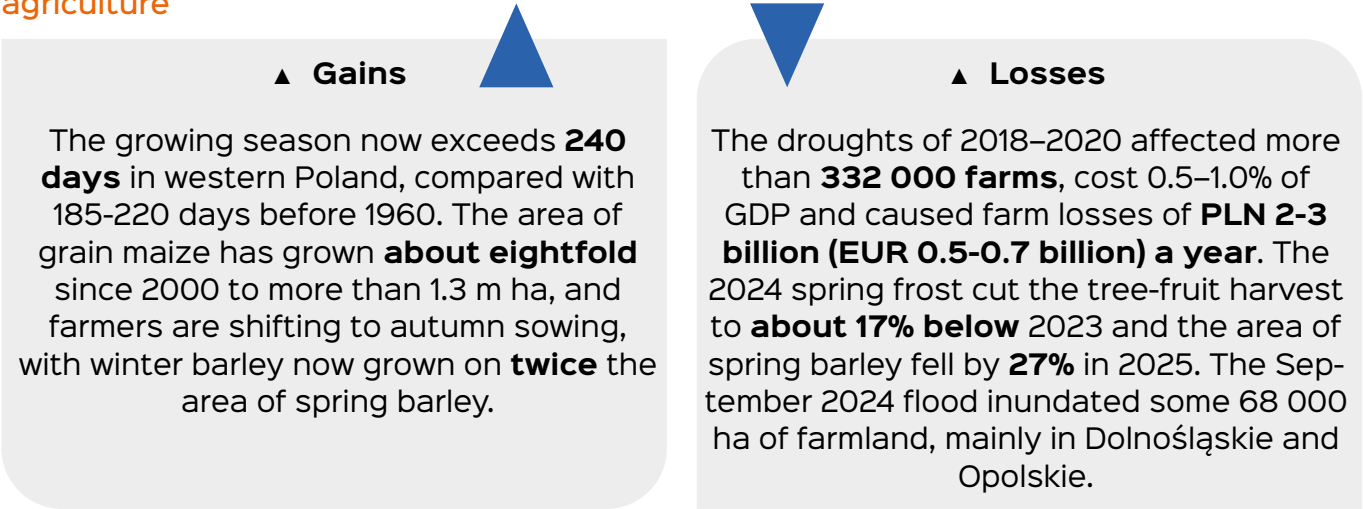
Poland is warming about twice as fast as the global average

The year 2024 was the warmest on record in Poland, with a mean temperature of **10.9°C** and summer temperatures have risen by about **2.3°C** since 1951. Annual precipitation has changed relatively little, but its **distribution** has shifted towards fewer rainy days, longer dry spells and more intense downpours that run off instead of soaking into the soil. Thinner snow cover further reduces the water available to crops in spring.

Agricultural drought is now recorded **in most years**. In 2025 the Vistula in Warsaw fell to its lowest level on record. Warmer springs also bring buds and blossom forward, leaving them exposed when cold air returns: ground frosts of about **-10°C** in April 2026 marked the **third damaging frost spring in a row**.

Impacts are already visible

FIGURE 5
Observed effects of climate change on Polish agriculture

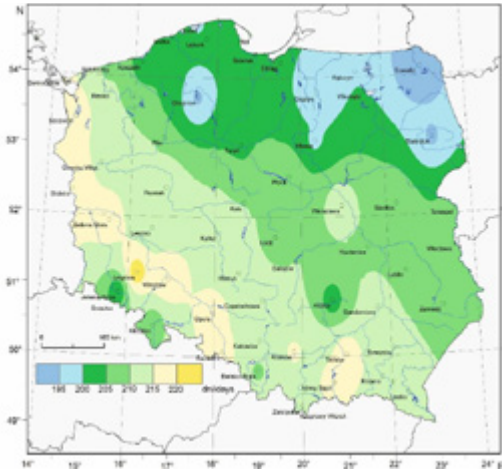


Poland’s exposure is amplified by structural factors. About **98% of the agricultural area is rainfed** and irrigated land accounts for less than 2%, against an EU average of

around 9%. Renewable fresh-water resources stand below **1 700 m³ per inhabitant**, the United Nations threshold for water stress, and the drainage systems covering

6.5 million hectares were designed to **remove excess water rather than retain it**.

FIGURE 6
Duration of the growing season in Poland, 1961–1990 (days)

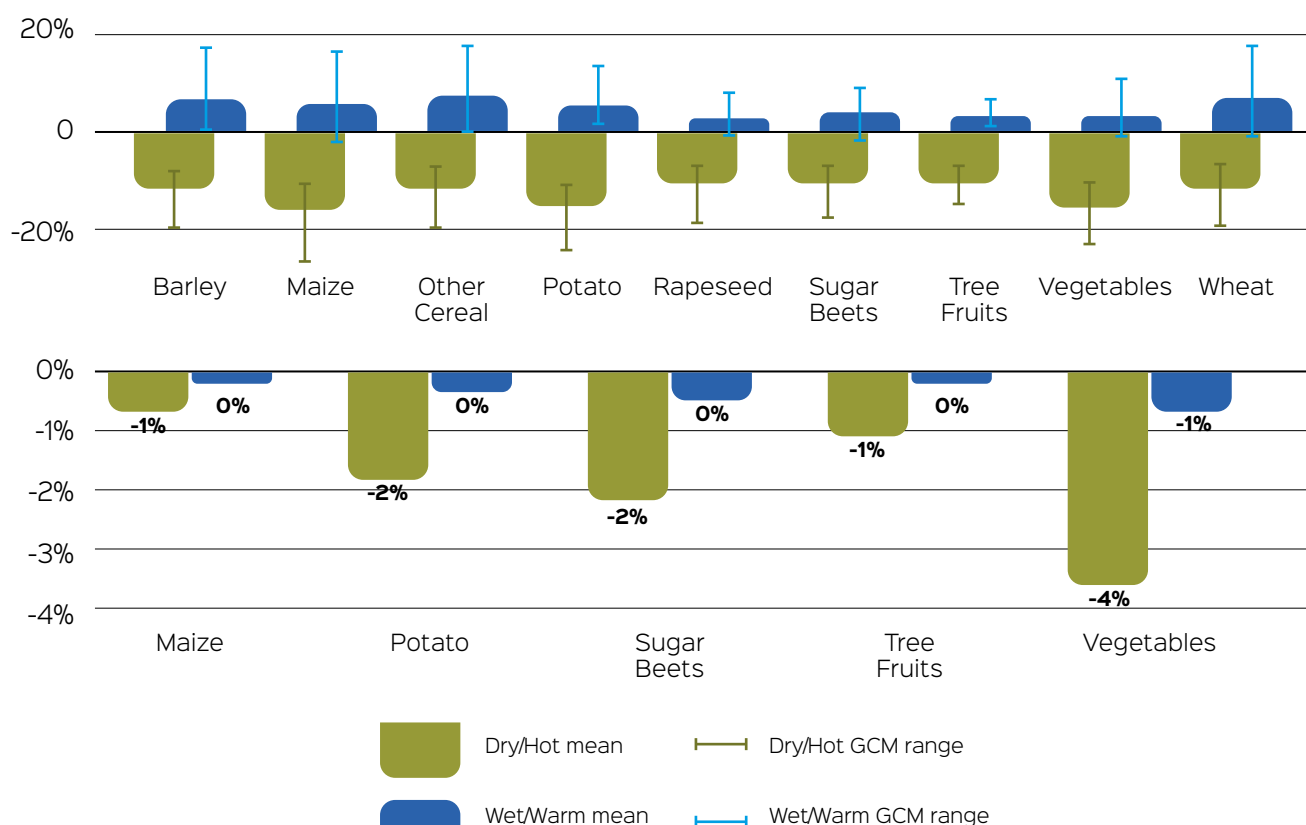


Climate losses are projected to grow, making adaptation a cost-effective investment

Agricultural **water requirements are expected to rise by 25–30% by 2050**. In a dry and hot scenario, rainfed crop production would fall by about 12% by 2041–2050, with potatoes losing up to 30% and wheat around 15% in the Lublin region, while a wetter and warmer pathway could bring gains of about 5.4%. Irrigated crops face losses in every scenario, which means

that **investment in irrigation is robust across the full range of possible futures**. Livestock productivity also declines under all warming trajectories, and orchards will remain exposed to spring frost because earlier bud break offsets the reduction in frost days.

FIGURE 8
Projected production shocks to rainfed (above) and irrigated crops (below), by crop type, 2041–2050



Source: World Bank Group (2024), Country Climate and Development Report: Poland.

The economic case for adaptation is favourable. Without adaptation, climate impacts on infrastructure, agriculture and labour productivity could cost Poland about 1.2% of GDP by 2050, whereas resilience investment of around 0.1% of GDP a year over 25 years would offset almost all of that cost.

1.2% of GDP

cost of climate impacts by 2050 without adaptation

0.1% of GDP

annual resilience investment over 25 years – offsets almost all of it

USD 1.7 bn

irrigation + climate-smart package eliminating crop losses by 2040–2050



FUTURE OF AGRICULTURE IN POLAND AND IN EUROPE

The transition must be framed as an opportunity, not an obligation

The recent backlash against EU sustainability requirements shows that climate adaptation cannot be presented as another obligation. **84% of Polish farmers** associate the European Green Deal negatively, compared with 52% of all respondents. **Bureaucracy, financial strain and public-good measures** together accounted for more than 60% of the causes cited in the 2024 farmer protests across the EU.

Adaptation should therefore be communicated as a way to **lower production costs, improve profitability and create new sources of income**. It also has to be pursued as a combination of technological, social and institutional innovation that involves the whole food system, from processing and retail to consumers, rather than primary production alone.

Resilience has three complementary dimensions

FIGURE 9
Multidimensional concept of agricultural resilience

Robustness	Adaptability	Transformation potential
stability despite shocks	adjusting to new conditions	long-term capacity to change
Robustness relies on self- and regional sufficiency and on local resources, which reduces dependence on synthetic fertilisers, pesticides, fossil fuels and exclusive seed sources. Its importance was shown when fertiliser prices almost quadrupled between November 2020 and April 2022.	Adaptability requires a coherent combination of technologies and policies covering crop, soil, water, fertilisation and livestock management. It also depends on risk management, diversification and timely climate information for farmers.	Transformation potential means preparing for megatrends such as competition for land with energy, which favours agrivoltaics, wind and biogas on farms. Healthy diets and halved food waste could mean 6% less agricultural land and 17% lower production by 2050.

The report lists a broad catalogue of available adaptation measures, from changing sowing dates and crop varieties to precision fertilisation, rainwater retention, feed management, diversification and digital advisory services. Their effectiveness depends on farm type, which matters because European agriculture is consolidating quickly. Between 2005 and 2020 about **5.1 million farms (36%) disappeared in the EU** while agricultural area fell by only 6.3%. Today **fewer than 10% of farms manage more than half of the EU's agricultural land**, which makes large holdings decisive for the sector's environmental performance.

Priorities for European agricultural resilience

An expert panel convened during the Polish Presidency recommended that **CAP funding** be used to build adaptation and transformation capacity in farming and that the CAP be linked with other EU instruments so that transformation can also be financed among **processors, distributors and innovators**. The panel also called for **simpler and faster funding procedures** that prioritise innovation, resilience and environmental performance, and for a **long-term strategic framework to 2040 and 2050** that would give farmers and business-

es a predictable transition path. Working together with like-minded countries such as the Netherlands would strengthen the case for these measures at EU level.

OPPORTUNITIES FOR DUTCH COMPANIES IN POLAND

Polish–Dutch agri-food relations rest on a strong and growing trade base

The Netherlands is one of Poland's key European trading partners, and Dutch exports to Poland grew by **nearly 37% between 2019 and 2021**, the fastest growth among the Netherlands' major trading partners together with South Korea.

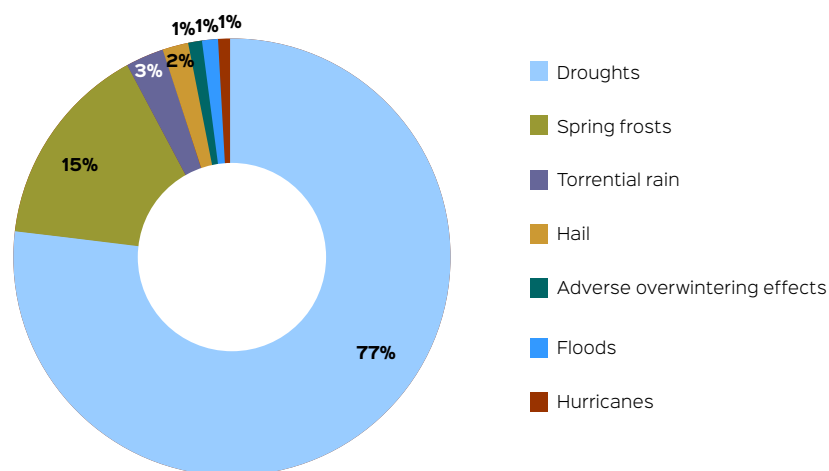
Despite considerable growth, as of 2025 Polish agri-food export value equals half the amount recorded by the Netherlands, which is the leader in this aspect among EU countries, with Poland placing 6th. Nevertheless, the gap between the two countries decreases quickly, as the same indicator totalled ca. 1/3 of the Dutch one in 2016.



Irrigation technologies

The Netherlands has developed world-leading expertise in precision irrigation and digital water management, combining real-time sensors, satellite monitoring, and data-driven decision support systems. By implementing these technologies, Polish farmers could counteract drought, which is the single most important cause of production and economic losses in agriculture, responsible for 77% of total losses.

FIGURE 10
Percentage of total losses
in agriculture in Poland
resulting from extreme
events in 2017–2019



Source: Source: Institute of Environmental Protection – National Research Institute (IOŚ-PIB), 2023: Atlas skutków zjawisk ekstremalnych

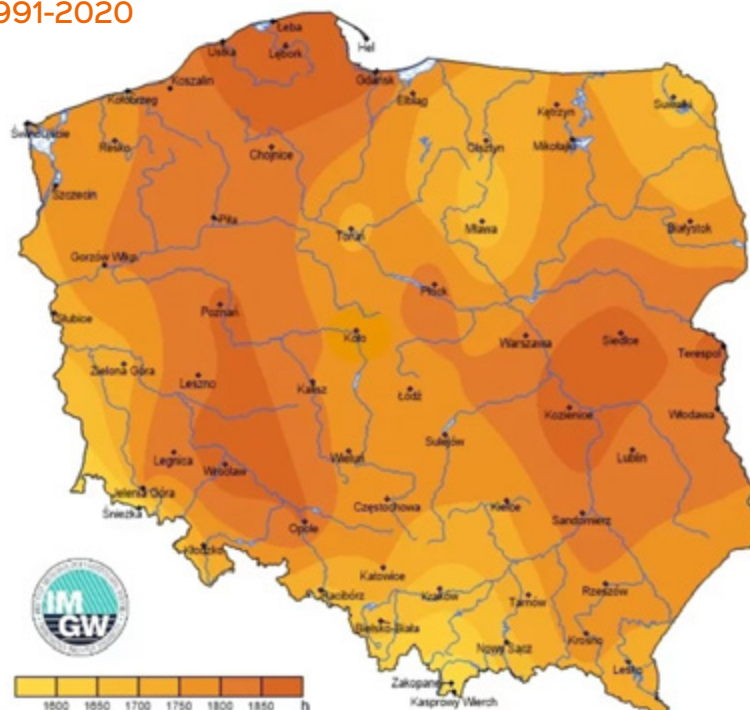
Dutch drip and precision irrigation systems and automated control systems could be particularly suitable for Poland's fruit, vegetable, and horticultural sectors. These technologies could be used in Polish developing greenhouse production, which is situated mainly in central Poland (Mazowieckie, Wielkopolskie, Kujawsko-Pomorskie, Łódzkie Voivodeships).

Polish farmers could also benefit from Dutch expertise in water retention and storage. The demand for such technologies might be the greatest in regions that have the highest irrigation demands. Highest demands are observed in central Poland, especially the Wielkopolskie, Kujawsko-Pomorskie, Łódzkie and Mazowieckie Voivodeships.

Combined renewable energy and agrivoltaics

One of the most promising areas for Poland is agrivoltaics, where photovoltaic panels are installed above or alongside crops. The number suggests that agrivoltaics would have the most sense in Wielkopolskie, Mazowieckie, Podkarpackie, Dolnośląskie, Lubelskie Voivodeships. The benefits of agrivoltaics are also dependant on particular crops selection. Some plants, e.g. blueberries plantations of which are on the rise in Poland require shade that photovoltaic panels can provide. Polish farmers could also benefit from Dutch innovations that maximize solar energy production through advanced technologies such as dual-axis solar tracking systems and concentrating solar collectors. Dutch experience in integrated energy management is particularly relevant for greenhouse horticulture, where renewable electricity can be combined with efficient heating, cooling, lighting, and climate control systems.

FIGURE 11
Average number of total
hours with sun during
the whole year in 1991-2020
period



Source: Instytut Meteorologii i Gospodarki Wodnej (2021): Zestaw norm klimatycznych dla Polski

Greenhousing and controlled-environment technology

Polish farmers could substantially benefit from adopting Dutch greenhouse and controlled-environment technologies, particularly in high-value horticultural production. Dutch greenhouses utilize high-performance glazing, automated shading systems, LED lighting, heat recovery, geothermal energy, and all-electric heating solutions supported by intelligent climate management software. It seems that the southern part of Wielkopolskie Voivodeship, Kujawsko-Pomorskie, south Mazovia region as well as eastern Lubelskie Voivodeship are regions with greatest potential for implementing such technologies in Poland.

Polish farmers could also benefit from Dutch expertise in hydroponic and substrate-based cultivation systems. Growing crops without soil reduces the risk of soil-borne diseases, enables higher planting densities, and improves control over nutrient delivery. Such production takes place in relatively big, specialized farms located in western Mazovia, Kujawsko-Pomorskie and Łódzkie Voivodeship.

Sustainable dairy and poultry production

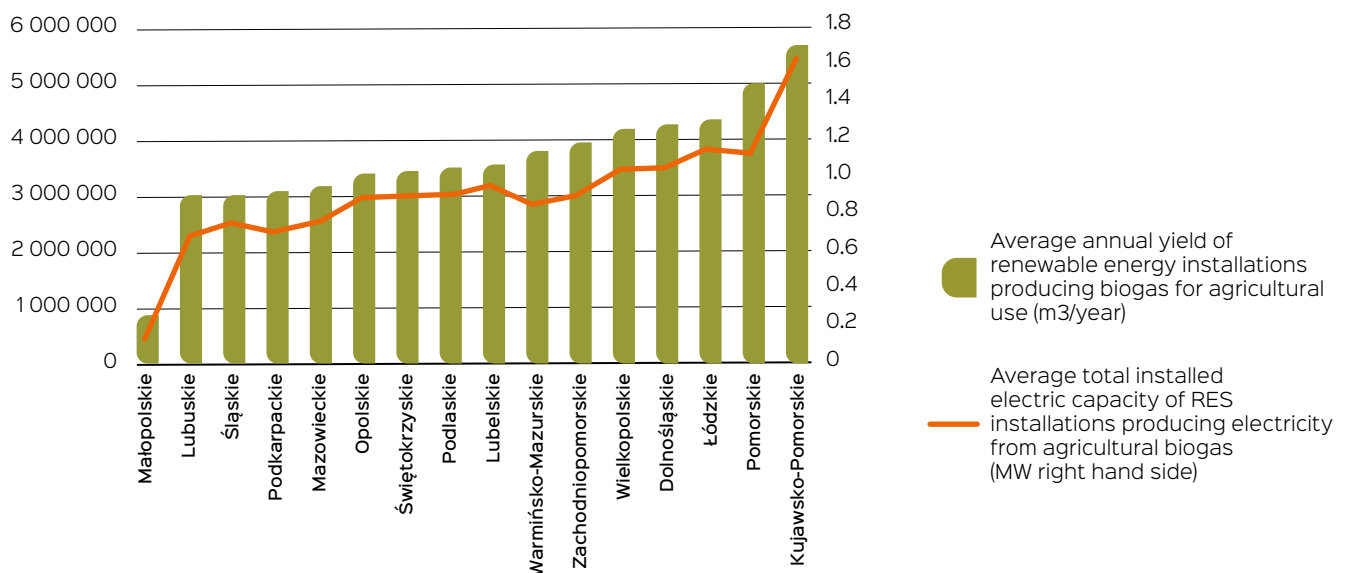
However, in the face of growing challenges arising from diseases and competition on the international market, it is becoming crucial to improve the quality of poultry meat produced in Poland. The use of modern technologies in production, such as intelligent farming management systems, feed management and monitoring of bird health, can contribute to a significant increase in efficiency and safety. Dutch management technologies could be used to this extent.

Milk production is one of the most important sub-sectors of agriculture, but its production typically leaves a considerable environmental footprint. Dutch companies could offer to introduce new technologies, such as milking machines and other types of supporting equipment, to increase the quality of milk and decrease labour costs. The use of renewable energy sources in dairy farms, recycling of production waste and providing appropriate management of living conditions and veterinary care are other important avenues for possible Dutch involvement. The main regions that should be considered for these types of business activities in milk and poultry sub-sectors are e.g. Warmia and Mazury, Podkarpacie, Lubelskie, Świętokrzyskie and Podlaskie Voivodeship.

Biogas plants and biorefineries and fertilisers

Given Poland's substantial agricultural land base and the country's status as a net energy importer, a thriving biogas sector represents a strategically important pathway toward both energy security and circular economy objectives. Rural Poland has significant untapped biomass potential (agricultural residues, forest biomass and organic waste streams) well suited to biogas-based renewable heating and off-grid power, including applications in district heating, local industry, and agriculture (e.g. greenhouse heating). Currently, agricultural biogas activity is most developed in western, north-western and northern Poland, where specialised livestock operations provide reliable supplies of organic residues, sustainable fertilisation practices are currently concentrated on larger, professionally managed farms, predominantly in western Poland.

FIGURE 12
Average annual capacity
(m³/year) and installed capacity
(MW) of RES installations
producing agricultural biogas
- breakdown by Voivodeship



Source: Blaszkę, Małgorzata. „Regional differentiation of agricultural biogas, biocomponent and biofuel production in Poland.” Environmental Protection and Natural Resources, vol. 35, no. 4, National Research Institute, Institute of Environmental Protection, 2025, pp. 14-28. <https://doi.org/10.2478/oszn-2025-0008>.

Precision agriculture and digital tools

Dutch expertise in precision agriculture and digital tools could improve Polish farms' productivity, lower production costs, and decrease externalities as a positive by-product. Dutch precision agriculture combines advanced sensors, artificial intelligence, satellite imagery, drones, and automated machinery to support data-driven farm management.

Currently precise crop-monitoring is used just to a small extent in Poland (total of 27 thousand farms in 2023), notably in farms in central Poland and Lubelskie Voivodeship, which is a leader in this aspect. Northern as well as south-eastern regions are regions where crop monitoring is almost not used and where the potential for such technologies could be the greatest. The use of GPS technology is even lower with just below 2 000 farms using this solution in 2023.

Dutch autonomous robots could perform weeding, seeding, soil sampling, and crop monitoring with high precision while minimizing soil compaction and reducing labour requirements. An additional avenue is to use robots for feed and cleaning in animal production facilities. In 2023 less than 14 thousand farms used autonomous robots of any kind. 55% of them were situated in Mazovia, Wielkopolskie, Lubelskie, Łódzkie and Kujawsko-Pomorskie Voivodeships. The rest of the country has a considerable untapped potential for such technologies.

Services supporting circularity in the agriculture

Cooperatives might be an efficient avenue for capturing value for farmers. This is exemplified by the cooperatives' 83% market share in total agricultural production in the Netherlands. While in Poland this practice is virtually nonexistent with a total of only 641 production groups in Poland as of 2026.

Digitalization offers additional levers: ICT-enabled advisory services, precision agriculture platforms, remote machinery maintenance, and online sales channels for local and ecological products can improve efficiency, strengthen producer-consumer links and reduce food waste along the value chain. Platforms enabling direct farm-to-consumer sales have begun emerging in Poland but remain well below their potential, particularly for premium ecological and locally sourced products. This is a considerable untapped potential as notable use of digital management applications is only visible in the Mazovia region.

FIGURE 13
Number of farms using
computer programs or
mobile applications in
their production in 2023



Source: Own elaboration based on Bank Danych Lokalnych: Gospodarstwa rolne stosujące systemy informacji zarządczej (<https://bdl.stat.gov.pl/bdl/start>).

FINANCING AND SUPPORT MECHANISMS

A comprehensive financing toolbox – but the binding constraint is on the demand side

A wide range of instruments is available to finance climate-resilient agriculture. They fall into four layers, shown below. The right combination depends on who invests: an individual farm, a producer group or cooperative or a processing or technology company.

Individual farms can combine CAP Strategic Plan investment support (farm modernisation, irrigation and small retention) or KPO grants (Agriculture 4.0 technologies, storage, renewable energy) with a loan guaranteed up to 80% by the Agricultural Guarantee Fund, including interest subsidies of up to 100% for young farmers and climate-related investments.

Producer groups and co-operatives are the most effective vehicle for scale-dependent technologies such as shared irrigation and retention, drying and storage, manure processing and precision machinery, because they can pool grants, carry larger guaranteed loans and act as a single counterparty for Dutch suppliers, banks and insurers.

Processors and agri-food companies can use KPO support for processing, storage and distribution, EIB and EBRD credit lines on-lent through Polish banks and leasing companies and insetting schemes in which they co-finance new practices and equipment on their suppliers' farms.

Know-how and knowledge transfer is financed through separate channels: EIP-AGRI operational groups under the CAP cooperation measure, Horizon Europe and the Soil Mission for joint research and demonstration and RVO and LAN instruments for the business-to-business layer and the market entry of Dutch companies.

FIGURE 14
Four layers of financing
for climate-resilient
agriculture in Poland

1. EU funding instruments

The **CAP Strategic Plan** provides over EUR 25 bn, and at least 25% of direct payments (more than EUR 4.3 bn) must go to eco-schemes such as carbon farming and nutrient management. The **KPO** dedicates about EUR 2.2 bn to the agri-food sector, while **Horizon Europe**, the Soil Mission, **EIP-AGRI** and **LIFE** fund research, demonstration and innovation.

2. Polish national and regional funds

The NFOŚiGW programme “**Energia dla wsi**” offers PLN 3 bn (EUR 0.7 bn) for 2022–2030, with grants of up to 65% and loans of up to 100%, and its first call was almost twice oversubscribed. The state also subsidises up to 65% of **crop insurance** premiums (PLN 920 m in 2025), yet only **about 16% of producers are insured**.

3. Dutch and international funds

The **Netherlands Agricultural Network** at the Dutch Embassy supports bilateral cooperation, building on the completed RVO project “**Soil Improvement Poland**” (2022–2025), which aimed to reach some 100 000 farmers. The **World Bank**, the **EIB** and the **EBRD**, which committed EUR 1.35 bn in Poland in 2025, add large-scale climate finance.

4. Public–private and blended finance

The **Agricultural Guarantee Fund** run by BGK covers up to 80% of a loan and had secured almost PLN 5 bn (EUR 1.14 bn) of credit by November 2025. Farm investments increasingly combine grants, guaranteed loans and **vendor financing**, while **carbon farming** programmes and insetting schemes such as Klim and Bayer–ADM create a new private income stream.

The instruments exist, but the farms that most need to adapt use them least. CAP money is spread thinly across a very large population of small recipients: among the 80% of beneficiaries receiving the lowest payments, **more than 90% are farms below 10 hectares**. Innovation funding faces a similar absorption problem. Poland has **200 EIP-AGRI operational groups**, while the Netherlands has 170 with less than one-twentieth of Poland’s farm population, which suggests that the real gap lies in **advisers, brokers and research-prac-**

tice links rather than in money.

Private climate finance is also changing. From **27 September 2026**, EU rules ban product claims such as “climate neutral” that rely on offsets outside the product’s own value chain, which increases the value of **insetting**, where processors finance emission reductions on their suppliers’ farms.

DIRECTIONS FOR POLISH- DUTCH COOPERATION

Cooperation should combine funding sources, aggregate small farms and work across institutions

The most promising model divides roles between funding sources. **EU instruments such as Horizon Europe, the Soil Mission and EIP-AGRI can finance research and demonstration, while RVO and LAN instruments can finance the business-to-business layer of cooperation.** This division of labour has already proven effective in the soil-quality partnership and can be replicated for water-efficient horticulture, precision livestock farming and manure processing, for example by pairing Polish demonstration farms, advisory centres and institutes such as IUNG-PIB with Dutch technology providers and research organisations such as Wageningen University & Research.

Because small farms lack the knowledge, cash flow and scale to combine the available instruments, **bankable project pipelines should be built around producer groups and cooperatives.** Dutch technology suppliers, agricultural banks and insurers can take part in blended structures alongside BGK guarantees and EU funds,

including index-based insurance products, and the Dutch experience of **cooperative agricultural finance** can help solve the access-to-capital problem that Polish farms face today.

Finally, cooperation programmes should be designed to **work across agriculture, water, environment and spatial planning institutions** and to strengthen local administrative capacity. At the European level, Poland and the Netherlands can speak with one voice for a CAP and a funding framework that make resilience and adaptation a central priority.

PRIMARY BARRIERS TO BE ADDRESSED

FIGURE 15

Main barriers to climate-resilient agriculture and Polish-Dutch cooperation

Structural

Most farms are small and undercapitalised, hidden unemployment and uncertain succession discourage long-term investment, and trust in formal cooperation remains low.

Economic

Farmers face a cost-price squeeze and volatile incomes, small farms cannot finance scale-dependent technologies, and crop insurance is used by only a minority of producers.

Institutional and regulatory

Water and drought competences are dispersed, ad hoc compensation replaces prevention, and parallel programmes follow different rules, while agrivoltaics still faces legal hurdles.

Knowledge and technology

Monitoring and advisory tools are not integrated into farm decisions, digital adoption is limited to large farms, and few farmers understand how carbon credits work.

Social acceptance

Many farmers reject EU green requirements and perceive the transition as an obligation rather than an opportunity to lower costs and earn new income.

Specific to foreign partners

Permits and co-financing are decided at several levels of government, and there are too few innovation brokers and advisers able to assemble consortia.





2

**Interplay
between
agriculture
and the triple
planetary
crisis**



Interplay between agriculture and the triple planetary crisis

2.1.

Planetary crises
and their consequences
for the agricultural sector

The triple planetary crisis, also called the polycrisis, comprising of climate crisis, biodiversity loss and pollution, poses significant challenges to agricultural production, food and water security and in effect livelihoods worldwide. What is the most daunting is the fact that each of these crises fuels others making their aftermath much worse than the sum of individual predicaments². Therefore timeliness of appropriate intervention to stop the adverse effects as soon as possible, is of crucial importance. This concerns the agro-cultural sector specifically, as these effects are already highly visible and could be exacerbated further in a relatively short time.

A diverse range of environmental adversities includes extreme weather events, shifting precipitation patterns, water scarcity, increased frequency of pests and diseases and rising temperatures. All of these have profound impacts on agricultural systems while their true danger lies in compounding existing vulnerabilities. These conditions lead to reduced

crop and rearing yields, altered growing seasons and production instability.

Rising temperatures coupled with biodiversity loss increase evaporation, leading to diminished crop yields, with up to 8 percent decline for every 1°C of additional warming³. Fruit and nut trees and natural forests are also subject to production losses and are becoming increasingly vulnerable to catastrophic wildfires, which is a compounding factor with extreme heat. Climate crisis also affects rearing productivity which in a high-emission scenario is projected to decline annually by USD 40 billion in 2005 dollars for cattle farming alone. This is due to nearly 50 percent of the world's cattle being exposed to dangerous heat by 2100. Rural communities are on the frontlines of the extreme heat crisis as 470 billion labour hours were lost globally due to extreme heat in 2021 alone. This stems from the fact that agricultural workers are 35 times more likely to die from occupational heat exposure than workers in other sectors combined⁴.

2 IPCC, 2023: Sections. In: Climate Change 2023: Synthesis Report. Contribution of Working Groups I, II and III to the Sixth Assessment Report of the Intergovernmental Panel on Climate Change [Core Writing Team, H. Lee and J. Romero (eds.)], IPCC, Geneva, Switzerland, pp. 35-115, doi: 10.59327/IPCC/AR6-9789291691647

3 Tran, BL., Tseng, WC. & Chen, CC. Climate change impacts on crop yields across temperature rise thresholds and climate zones. Sci Rep 15, 23424 (2025). <https://doi.org/10.1038/s41598-025-07405-8>

4 FAO and WMO. 2026. Extreme heat and agriculture – FAO–WMO joint report. Rome and Geneva. <https://doi.org/10.4060/cd9394en>

It must be underlined that even though overall agricultural productivity has increased globally in the last 50 years, climate crisis has had a negative impact on this indicator. The effects were mostly visible in mid- and low latitude regions, while there were some positive impacts in some high latitude regions, e.g. most of Europe. This does not mean that the overall effect of climate change is positive for the region. Climate crisis coupled with biodiversity loss and pollution results in the proliferation and altered dis-

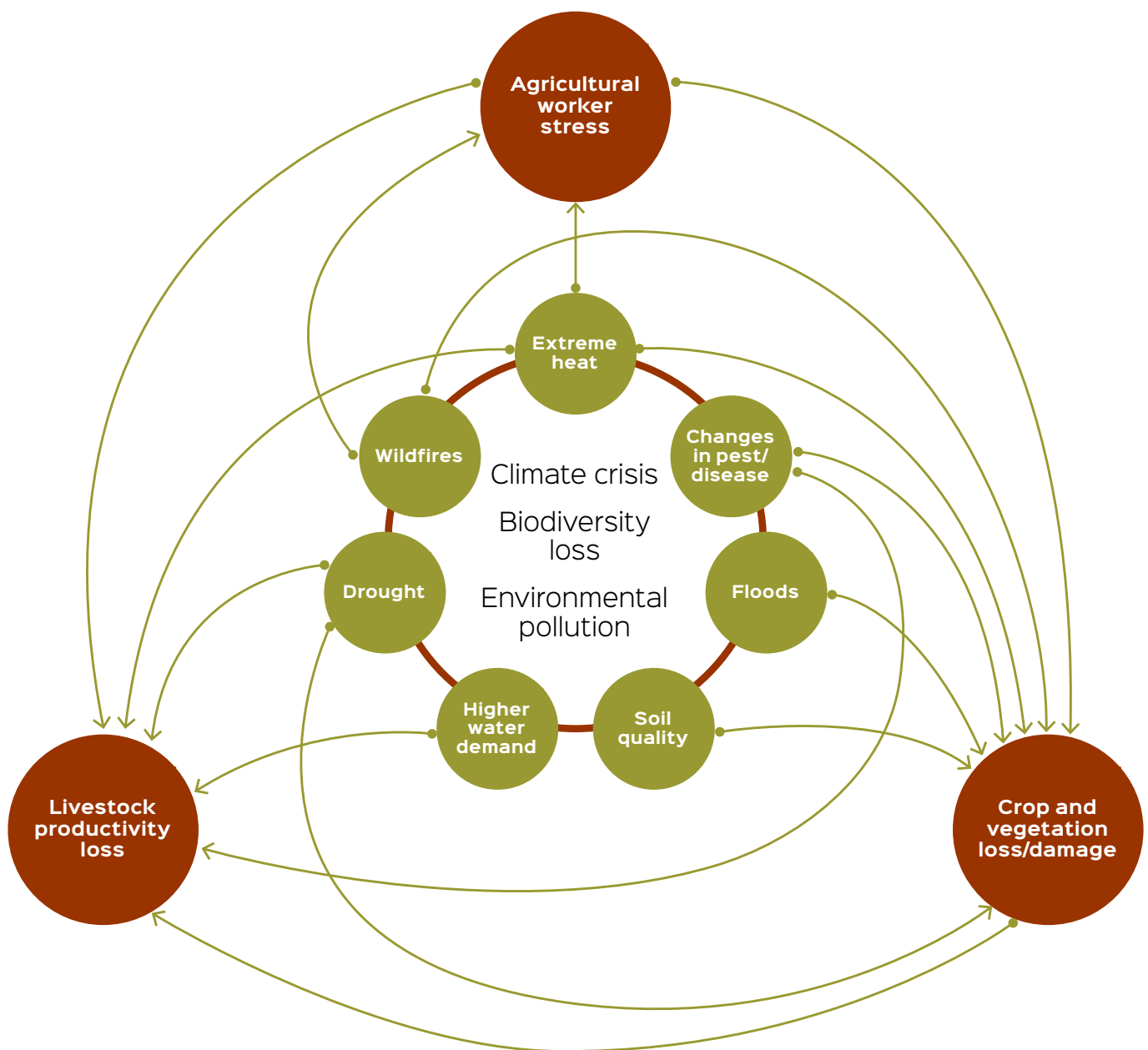
tribution of pests and diseases that pose additional threats to agricultural productivity. At the same time it affects water security precipitation patterns and greater frequency and intensity of climatic extremes. Droughts or intense rainfall disrupt water supply stability and irrigation systems, affecting crop growth and soil quality. There is no doubt that global warming will increase dry-land water scarcity, which is already a major problem that Europe and the rest of the world has to face.

These environmental adversities disproportionately affect small-scale farmers and vulnerable communities, exacerbating inequalities and increasing the risk of food insecurity. Global efforts to reduce greenhouse gas emissions and limit global warming are crucial in preventing further escalation of climate crisis-induced adversities and safeguarding agricultural productivity for future generations. With billions of livelihoods at stake, building resilience is no longer optional; it is imperative.



Interplay between agriculture and the triple planetary crisis

FIGURE 16
Triple planetary crisis
effects and their out-
comes for the agricultural
sector



Source: own elaborations based on FAO and WMO, 2026. Extreme heat and agriculture – FAO–WMO joint report. Rome and Geneva.
<https://doi.org/10.4060/cd9394en>

2.2.

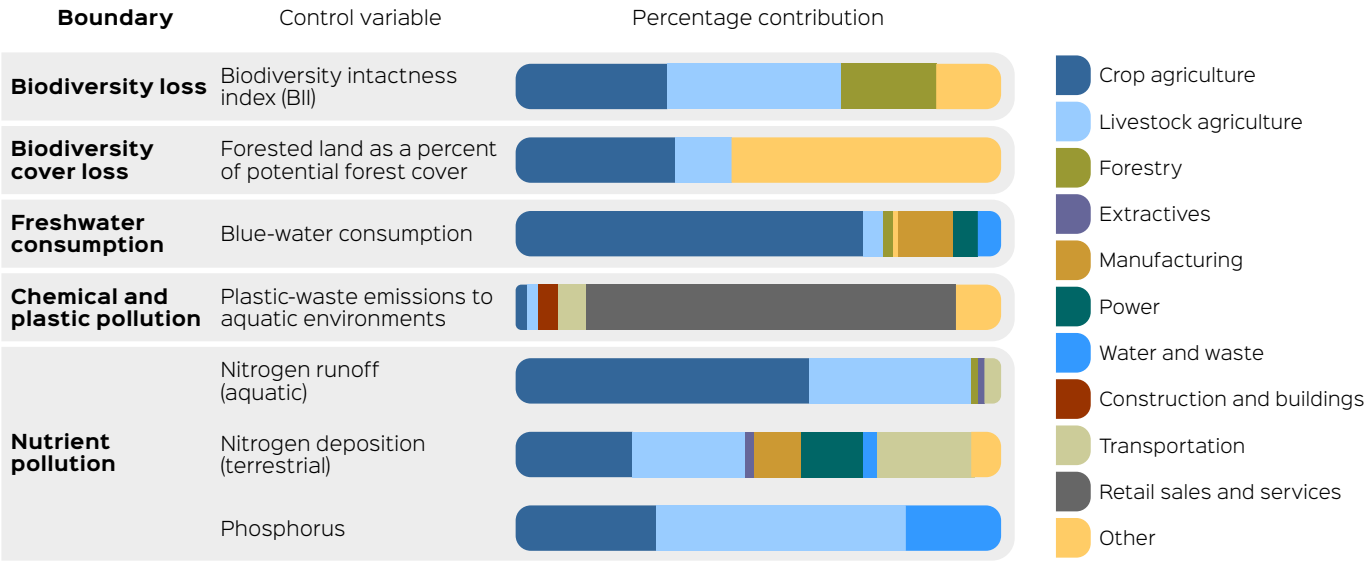
The effects of farming on the planet

The climate crisis, biodiversity loss and environmental pollution affect the agricultural sector as depicted above. However, the triple planetary crisis and farming are interdependent. In other words agricultural production and consumption fuel the triple planetary crisis as well. Its detrimental effects on our planet are significant and universal.

Globally agriculture is the biggest contributor to the depletion of natural capital⁵. Crop agriculture alone is responsible for 72 percent of freshwater consumption and 61 percent of nitrogen runoff pollution. Combined livestock and crop agriculture contribution to biodiversity loss

equals an astounding 85 percent. Unsustainable agricultural expansion increases ecosystem and human vulnerability and leads to competition for land and/or water resources. Agriculture’s significant negative effect on our planet stems from its direct land footprint as well as the use of its products in numerous other sectors.

FIGURE 17
Sectoral contribution towards each planetary boundary on relative scale



Source: McKinsey (2022): Nature in the balance: What companies can do to restore natural capital

5 McKinsey (2022): Nature in the balance: What companies can do to restore natural capital

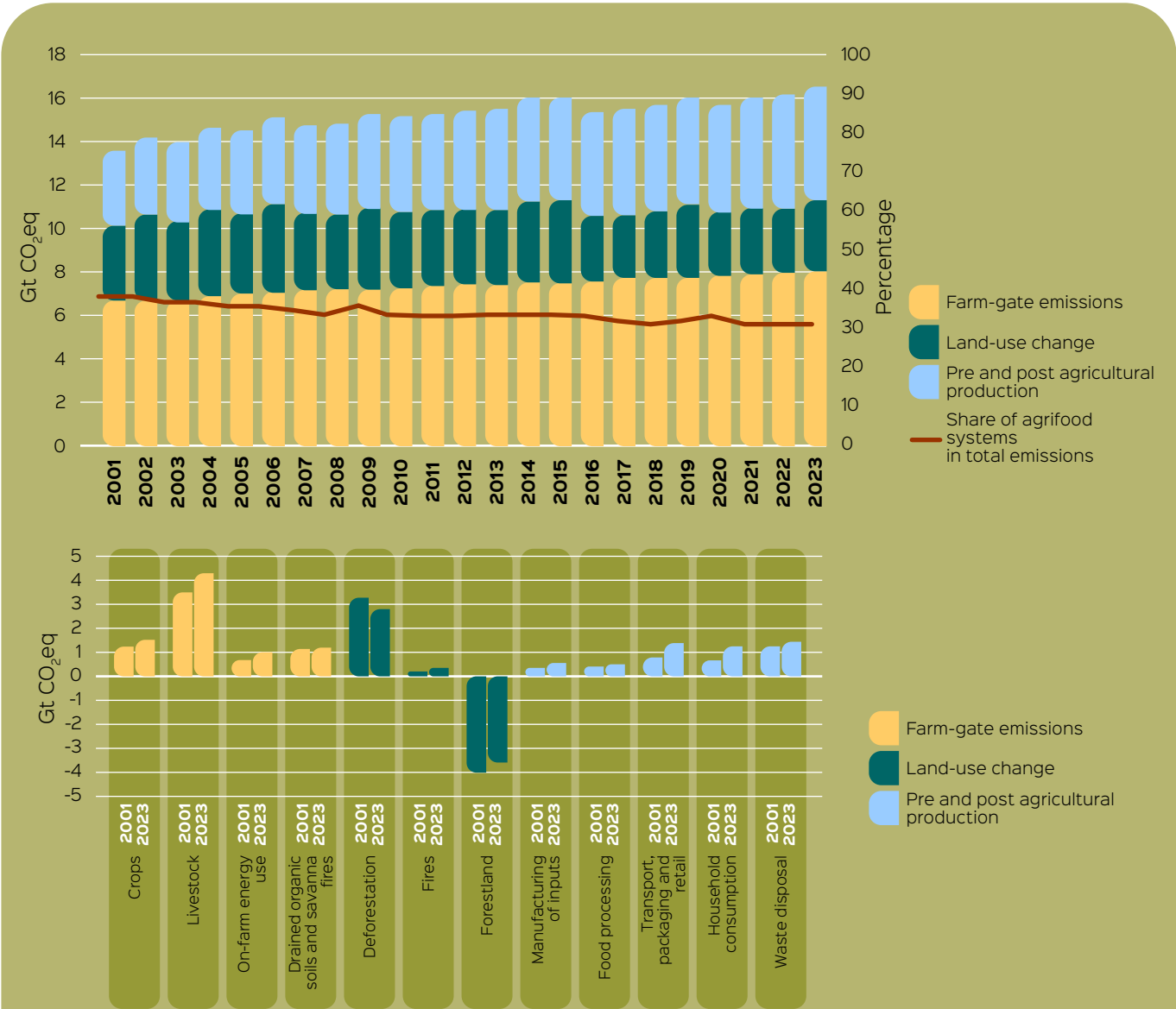
Interplay between agriculture and the triple planetary crisis

Let us not forget about the important role agrifood systems play in fuelling the climate crisis alone. The sector accounts for about one-third of total anthropogenic greenhouse gas (GHG) emissions, i.e. 16.5 billion tonnes of carbon dioxide equivalent in 2023. Almost half of those result from direct emissions

from farming. Livestock emissions were the largest single component, followed by land use change, caused by deforestation, biomass fires and peatland degradation processes often linked to land clearance for agriculture. What is a rising source of emissions is post agricultural production processes

including food manufacturing, retail, household consumption and food disposal.

FIGURE 18
Global agrifood systems emissions by component and share of agrifood systems emissions in total emissions



Source: Greenhouse gas emissions from agrifood systems Global, regional and country trends, 2001–2023 FAOSTAT Analytical Brief 115

Building resilience in the agricultural sector requires limiting pressure on the environment, specifically to decrease the resources needed to carry out farming activities. Lower energy, water or fertiliser needs will not only prepare agriculture for the polycrisis-caused adversities. They will also directly diminish the cause of climate crisis, biodiversity loss and environmental pollution. Therefore adapting to the triple planetary crisis also means diminishing negative externalities of the sector - a win-win situation that

underlines the need to act decisively in the quest for a sustainable agri-food sector.

These actions should not stop at limiting negative effects. Innovative technologies in agriculture (see: Annex A) go beyond simply reducing the sector's environmental footprint or adapting to the climate crisis. They can be used to actively contribute to addressing the systemic challenges facing agriculture, including climate change, biodiversity loss, water scarcity and soil degradation. By supporting the restora-

tion of natural ecosystems, technological innovation can help transform agriculture from a source of environmental pressure into an important part of the solution. In this context, the adoption of state-of-the-art technologies should be viewed not only as an opportunity to make agricultural production more efficient, but also as a means of strengthening the sector's long-term resilience and contributing to broader environmental goals.



Interplay between agriculture and the triple planetary crisis

2.3.

Reconciliation of planetary needs with agri-food production through sustainable agri-culture concepts

Sustainable agriculture is widely recognized as an integrated approach to food production that seeks to satisfy current societal needs while preserving the natural resource base for future generations. Rather than focusing exclusively on maximizing short-term productivity, it promotes a balanced framework that simultaneously considers environmental protection, economic viability, and social well-being. This systems-based perspective acknowledges the close interdependence between agricultural production, ecosystem services, rural livelihoods,

and food security, emphasizing that long-term agricultural sustainability depends on maintaining the health and resilience of the entire farming system. There are a number of sustainable agriculture concepts, but each one of them focuses on balancing the use of resources to stabilize the production in the long term.

TABLE 1
Description of selected sustainable agriculture concepts

Agroecology	Organic production	Regenerative agriculture	Circular agriculture
Agroecology is “a holistic and integrated approach that simultaneously applies ecological and social concepts and principles to the design and management of sustainable agriculture and food systems, to optimize the interactions between plants, animals, humans and the environment while also addressing the need for socially equitable food systems” (FAO, 2020[53]).	Organic production is an overall system of farm management and food production that contributes to the preservation of natural resources and applies high animal welfare and production standards.	Regenerative agriculture stresses soil restoration and the interplay of crops and farm animals. The concept of regenerative agriculture is broader and less prescriptive than agroecology and organic agriculture, as it accepts a targeted use of modern plant and animal breeding technology, tilling, and inorganic fertilisers or pesticides (EASAC, 2022[60]).	Circular agriculture focuses on using minimal amounts of external inputs, closing nutrient loops, regenerating soils and minimising the impact on the environment. Circular agriculture does not reflect a specific set of farm practices or standards, though it is often associated with mixed crop-livestock production, organic production and agro-forestry.

Source: Own elaboration

Though sustainable agriculture can use many tools and approaches it is commonly described through its diminished effects on the environment and the society. These outcomes could be achieved mainly by lowering the need for resources: water, energy, minerals, biomass, etc. Therefore sustainable agriculture has an indirect effect on climate adaptation and resilience improvement. Unlike conventional agricultural systems, which have traditionally relied on intensive use of synthetic fertilizers, pesticides, herbicides, and other external inputs to maximize

yields, sustainable agriculture seeks to optimize production through ecological processes. It prioritizes long-term ecosystem functioning by improving soil health, diversifying production systems, and promoting biological regulation of pests and diseases and consequently diminishing the long-term risks as well as costs.

The resilience of sustainable agricultural systems stems from their ability to adapt to changing environmental, economic, and social conditions. Rather than optimizing production under a fixed set

of assumptions, sustainable farming promotes flexibility, diversification, and adaptive management.





3

Current State of Polish Agriculture



Current State of Polish Agriculture

3.1.

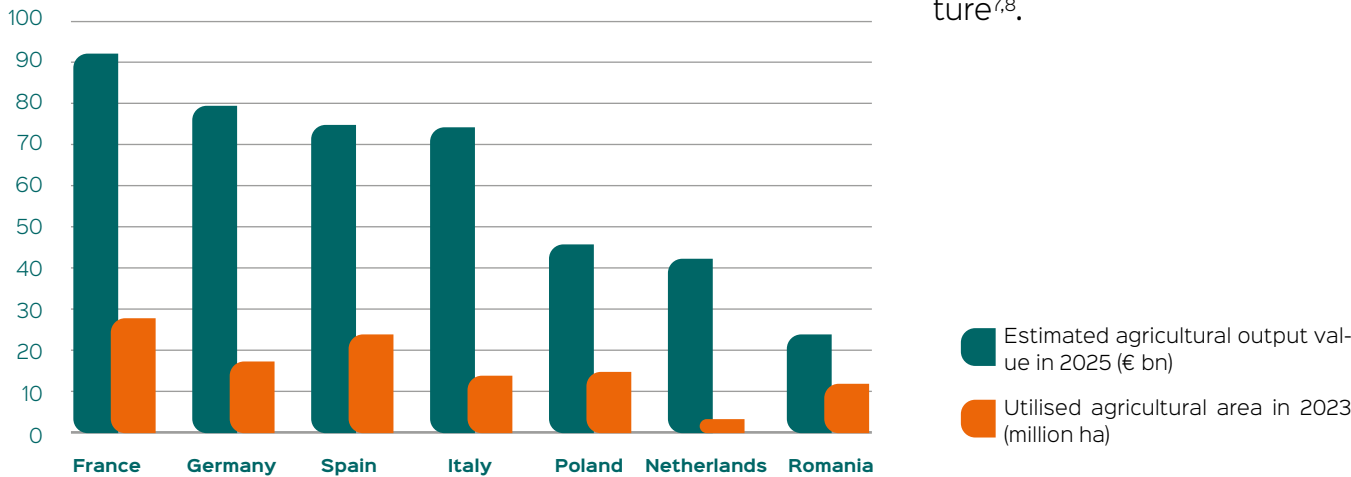
Sector's overall significance and development

Two transformations shaped today's Polish agriculture: the shift from a centrally planned to a market economy around 1990, and accession to the European Union in 2004, which brought the sector into the Common Agricultural Policy and opened the single market. Together with changing consumption patterns, technological progress and the modernisation of supply chains, they restructured both farming and the agri-food system built around it.

The sector remains strategically important to Poland's economy, territorial structure and food security. Utilised agricultural land covers more than two-fifths of the national territory and Poland still

has some 1.4 million farms⁶. With an estimated EUR 45.5 billion of output in 2025, Poland ranks fifth in the EU behind France, Germany, Italy and Spain; together with those four countries, the Netherlands and Romania it accounts for 76.1% of EU agricultural output value. Poland has approximately eight times the agricultural area of the Netherlands (14.6 million hectares compared with 1.8 million hectares), while the two countries generate a similar total agricultural output value. This indicates a significant difference in agricultural productivity per hectare and highlights the potential for Dutch technologies, expertise and production practices to facilitate efficiency and productivity of Polish agriculture^{7,8}.

FIGURE 19
Estimated agricultural output value, EU top 7, 2025 (EUR bn) and utilised agricultural area, 2023 (m ha)



Sources: Eurostat, *Performance of the agricultural sector* (aact_eaa01), https://ec.europa.eu/eurostat/statistics-explained/index.php?title=Performance_of_the_agricultural_sector; Eurostat, *Farm structural indicators: land use* (ef_fsi_lus), https://ec.europa.eu/eurostat/databrowser/view/ef_fsi_lus__custom_20811523/bookmark/table?lang=en&bookmarkid=4edd6acc-3d35-4c5c-b370-8a5bee94c904&c=1775046827000

6 European Commission, CAP Strategic Plan – Poland (country profile), https://agriculture.ec.europa.eu/cap-my-country/cap-strategic-plans/poland_en

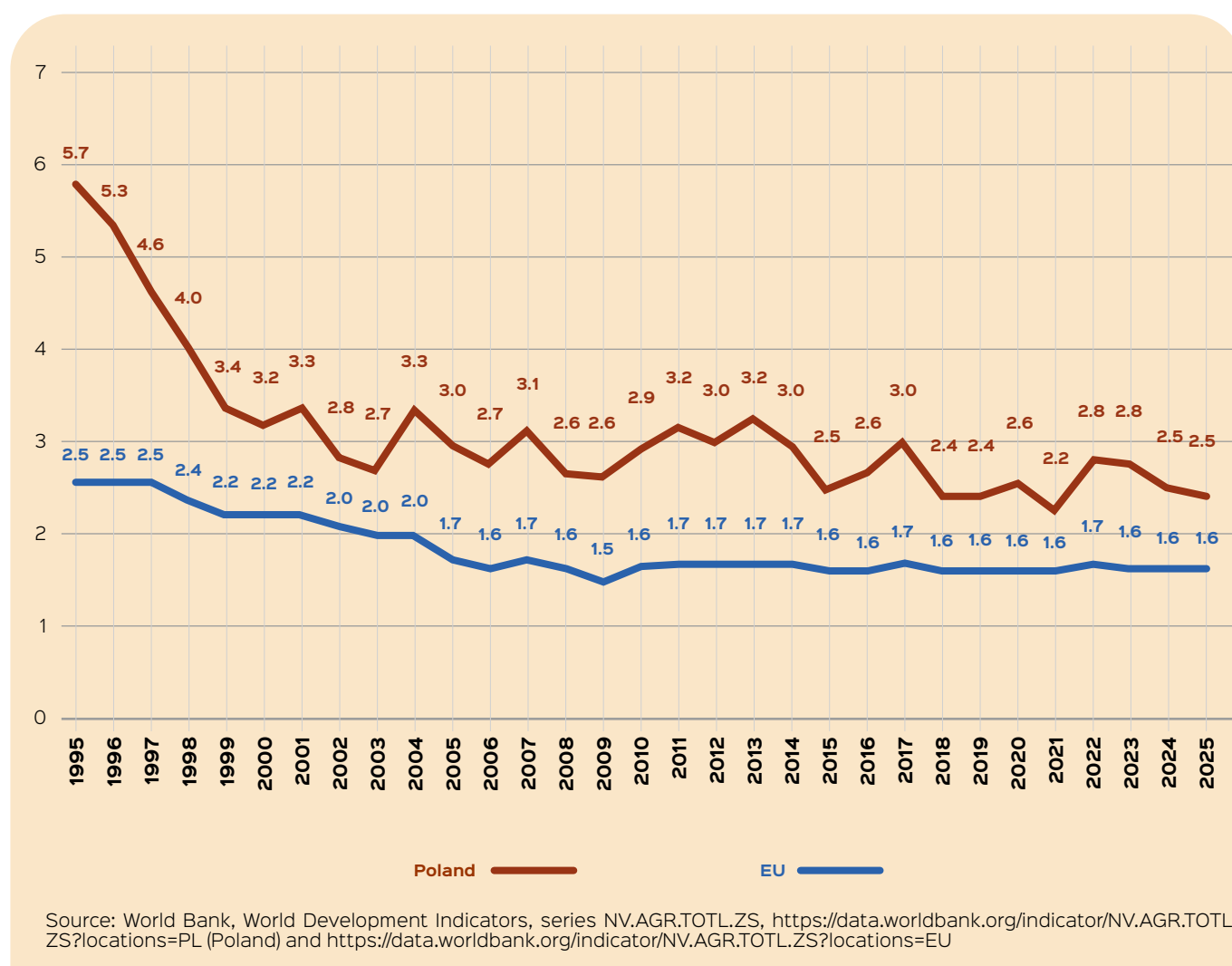
7 Eurostat, Performance of the agricultural sector, Statistics Explained (Economic Accounts for Agriculture, 2025 estimates; article updated 2026), https://ec.europa.eu/eurostat/statistics-explained/index.php?title=Performance_of_the_agricultural_sector

8 S. Dudek et al., Instytut Finansów Publicznych, 20 lat polskiego rolnictwa w UE. Perspektywa makroekonomiczna, Warsaw 2024, https://www.ifp.org.pl/wp-content/uploads/2024/03/20-lat-w-UE-polskiego-rolnictwa_Slawomir-Dudek.pdf

Measured against the whole economy, however, the sector's relative weight has been declining, as is typical of mature European economies. The share of agriculture, forestry and fishing in Poland's GDP has fallen from close to 6% in the mid-1990s to around 2.5% in 2025, although it remains well above the EU average of about 1.6%⁹.

The declining share of agriculture in Polish GDP mainly reflects the rapid growth of the overall Polish economy, which has been one of the fastest-growing in the EU since the mid-1990s, rather than a decline in agriculture itself.

FIGURE 20
Agriculture, forestry and
fishing, value added
(% of GDP), Poland
and the EU



⁹ World Bank national accounts data, Agriculture, forestry, and fishing, value added (% of GDP), indicator NV.AGR.TOTL.ZS, Poland and the European Union, <https://data.worldbank.org/indicator/NV.AGR.TOTL.ZS?locations=PL> and <https://data.worldbank.org/indicator/NV.AGR.TOTL.ZS?locations=EU>

Current State of Polish Agriculture

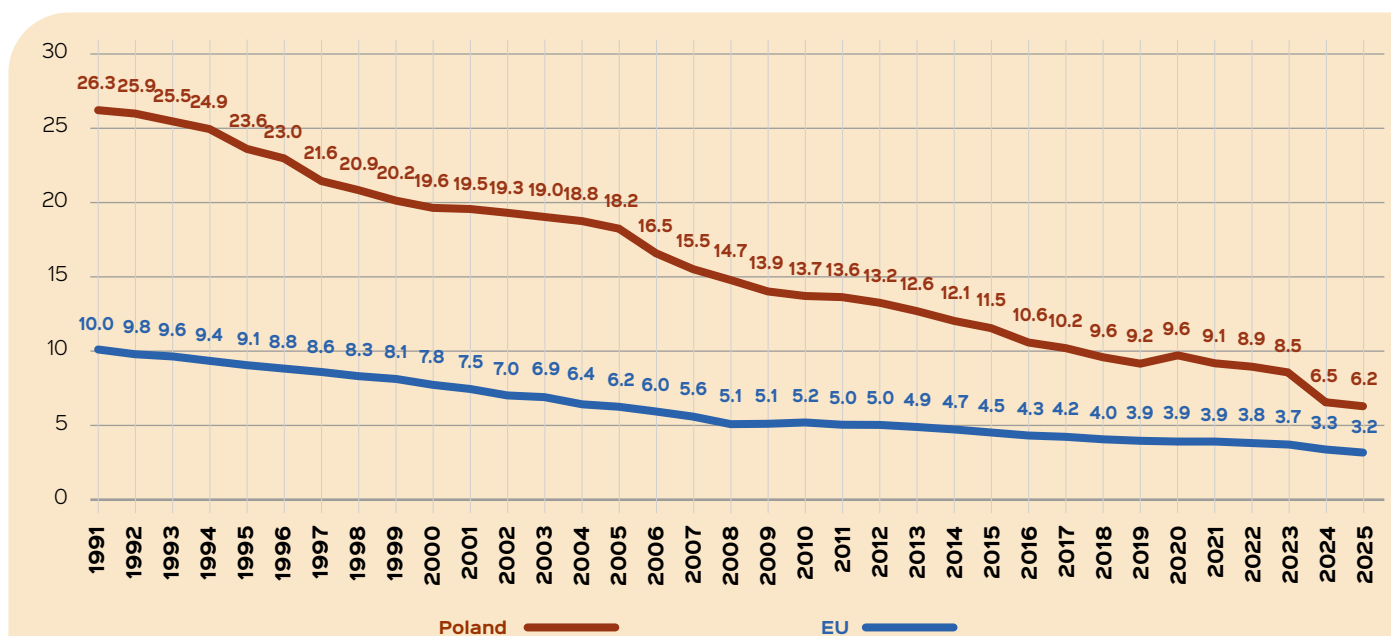
Two further mechanisms reinforce this. Productivity gains in farming are largely passed on to consumers and downstream industries as relatively cheaper food, while modern production depends on an ever larger volume of purchased inputs, which raises intermediate consumption and limits the growth of value added relative to gross output. Agricultural value added is inherently volatile, as the estimated 15.2% rise in the value of Polish agricultural output and the 27.8% rise in real farm income in 2025, the second-fastest gains in the EU, illustrate¹⁰. Poland's

trajectory is therefore a continuation of the structural transformation already observed in Western Europe: relative macroeconomic weight falls while productivity and supply-chain integration improve.

The labour market reflects the same ongoing structural transformation. Although the share of the employment in agriculture in Poland has been declining, from more than 26% in 1991 to 6.2% in 2025, Poland still employs a far larger share of its workforce in agriculture than most EU countries, which remains

one of the key structural features shaping the resilience challenge¹¹. Poland accounts for around 18% of the EU's agricultural labour on 9.1% of its agricultural land¹². Within the Polish economy, agriculture remains a large employer by EU standards, occupying 7.6% of the national workforce in 2023 compared with 3.8% in the EU as a whole, confirming the sector's continued social and labour-market importance¹³.

FIGURE 21
Share of agriculture
in total employment,
EU and Poland, 2023 (%)



Source: GUS, Rocznik Statystyczny Rolnictwa 2025, Warsaw 2025, <https://stat.gov.pl/obszary-tematyczne/roczniki-statystyczne/rocznik-statystyczny-rolnictwa-2025,6,19.html>

¹⁰ Eurostat, Performance of the agricultural sector, Statistics Explained (Economic Accounts for Agriculture, 2025 estimates; article updated 2026), https://ec.europa.eu/eurostat/statistics-explained/index.php?title=Performance_of_the_agricultural_sector

¹¹ Eurostat, Performance of the agricultural sector, Statistics Explained (Economic Accounts for Agriculture, 2025 estimates; article updated 2026), https://ec.europa.eu/eurostat/statistics-explained/index.php?title=Performance_of_the_agricultural_sector

¹² <https://stat.gov.pl/obszary-tematyczne/roczniki-statystyczne/roczniki-statystyczne/rocznik-statystyczny-rolnictwa-2025,6,19.html>

¹³ <https://stat.gov.pl/obszary-tematyczne/roczniki-statystyczne/roczniki-statystyczne/rocznik-statystyczny-rolnictwa-2025,6,19.html>

Foreign trade is the most visible indicator of the sector's development. In 2024 Polish agri-food exports reached a record EUR 53.5 billion against imports of EUR 35.6 billion, a surplus of EUR 17.9 billion, dominated by meat and live animals followed by cereals. Around 74% of export revenue was earned on the EU single market, with Germany alone taking more than a quarter¹⁴. The export profile is explained by tariff-free access to a large EU market, proximity to Germany and lower labour and land

costs that give Poland a durable advantage in labour-intensive segments such as poultry, meat processing, mushrooms and soft fruit. Poland is the EU's largest poultry producer, with 21% of EU output¹⁵, while tobacco products, confectionery and pet food reflect its role as a manufacturing and re-export base¹⁶. However, this export success also reveals a vulnerability. Poland's competitive advantage rests heavily on cost-efficient livestock systems (poultry, pork and dairy), which are among the

most climate-sensitive segments of agriculture: drought raises feed costs, animal production is water-intensive in a country with limited per-capita water resources, and heat waves depress milk yields, laying rates and animal performance while increasing mortality risk. The commercial foundation of the export model is thus precisely the segment most exposed to climate pressure.



14 GUS, Rolnictwo w 2024 r. / Agriculture in 2024, Warsaw 2025 (foreign trade in agri-food products); see also KOWR, Wyniki polskiego handlu towarami rolno-spożywczymi w 2024 r., <https://stat.gov.pl/obszary-tematyczne/rolnictwo-lesnictwo/rolnictwo/rolnictwo-w-2024-r-,3,22.html>

15 USDA Foreign Agricultural Service data, after: nawozy.eu, Polska jest największym producentem mięsa drobiowego w UE, <https://nawozy.eu/aktualnosci/newsy/z-kraju/polska-jest-najwiekszym-producentem-miesa-drobiowego-w-ue>

16 PAIH, Polska drugim eksporterem wyrobów tytoniowych na świecie, trade.gov.pl, 2024, <https://www.trade.gov.pl/aktualnosci/polska-drugim-eksporterem-wyrobow-tytoniowych-na-swiecie/>

Current State of Polish Agriculture

On the import side, meat remained the largest category in 2024, in one of Europe's leading meat exporters, because African swine fever and the exit of smaller producers have shrunk the domestic sow herd¹⁷. Fruit, coffee, tea and cocoa reflect climatic constraints and demand¹⁸, while oilseed imports reflect the structural deficit of domestic protein feed¹⁹. This trade structure generates two climate-related exposures: shocks abroad raise Polish costs through imported feed, and dependence on soybean meal ties the most competitive livestock sectors to volatile global markets. Both patterns strengthen the case for diversified feed, more domestic protein crops and a resilience strategy that extends beyond national borders²⁰.

FIGURE 22
Structure of Polish agri-food exports, 2024 (bIn EUR)

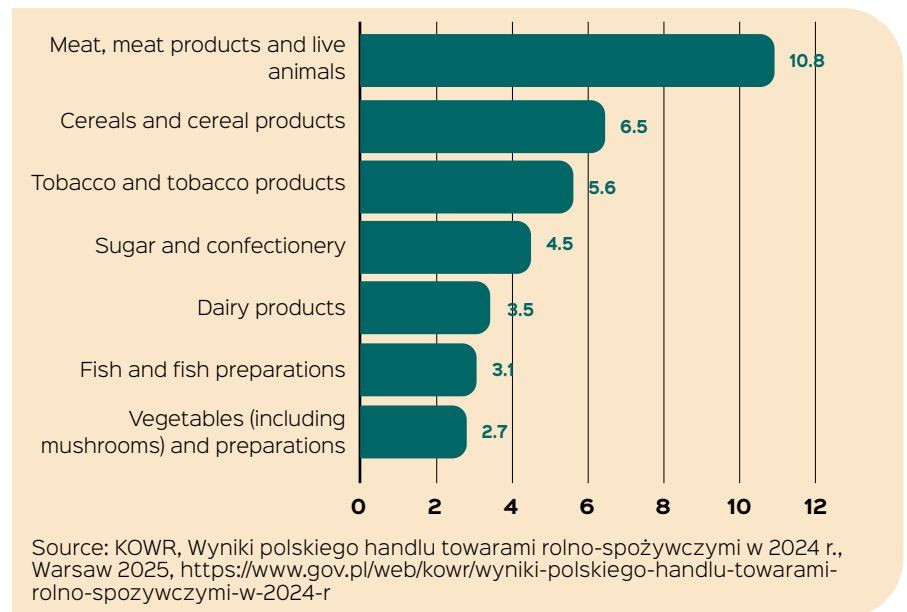
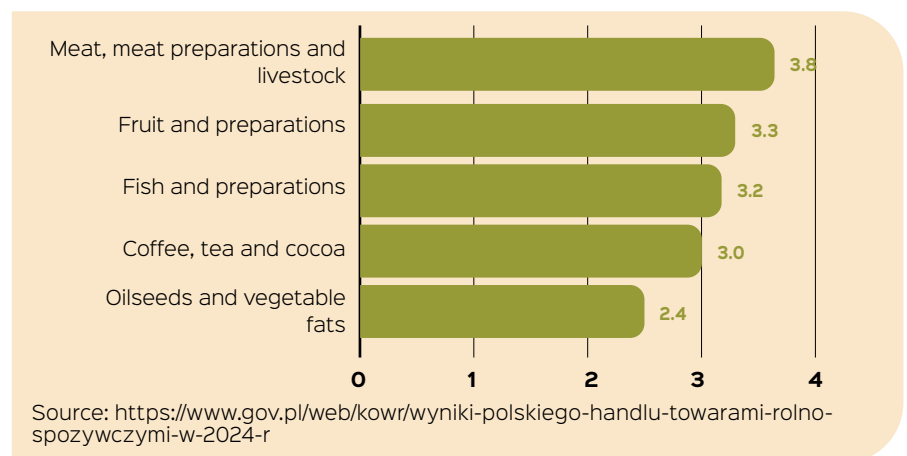


FIGURE 23
Structure of agri-food products import in 2024 Poland (bIn EUR)



¹⁷ TUW „TUW” / Portal Rolnika, Jak zmienia się produkcja zwierzęca w Polsce, January 2026, <https://portal-rolnika.pl/aktualnosci-rolnicze/jak-zmienia-sie-produkcja-zwierzeczka-w-polsce/>

¹⁸ Bank Pekao S.A., sector report on the Polish fish-processing industry, after: Portal Spożywczy, Europa nie traci apetytu na ryby z Polski, June 2026, <https://www.portalspozywczy.pl/mieso/wiadomosci/europa-nie-traci-apetytu-na-ryby-z-polski-eksport-napedza-losos-raport,289485.html>

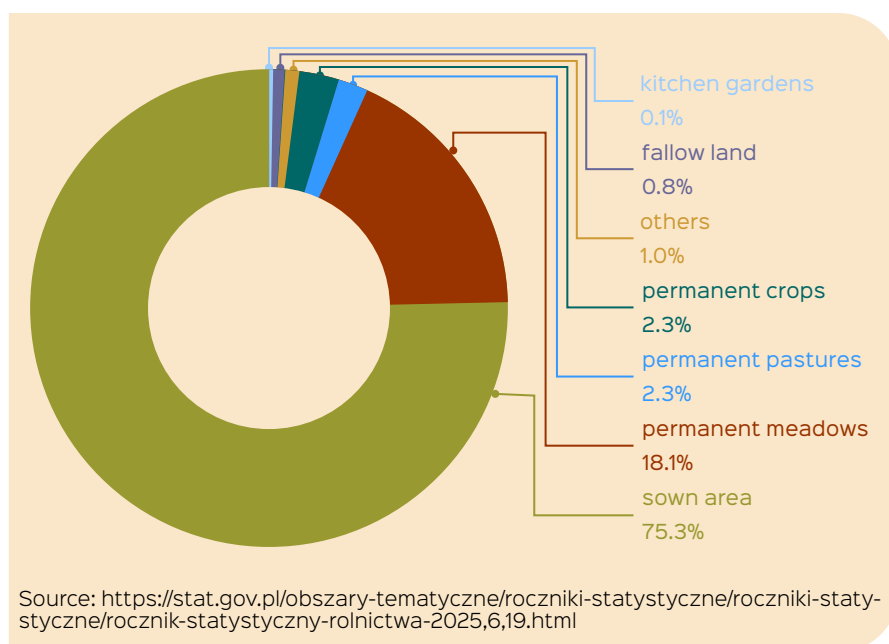
¹⁹ Grupa Cedrob / EY, 50 mld zł w ciągu pięciu lat, czyli jak zapewnić rozwój polskiego mięsa, <https://www.grupacedrob.pl/aktualnosci/z-zycia-firmy/50-mld-zl-w-ciagu-pieciu-lat-czyli-jak-zapewnic-rozwoj-polskiego-miesa>

²⁰ KOWR (National Support Centre for Agriculture), Wyniki polskiego handlu towarami rolno-spożywczymi w 2024 r., based on preliminary data of the Ministry of Finance, <https://www.gov.pl/web/kowr/wyniki-polskiego-handlu-towarami-rolno-spozywczymi-w-2024-r>

3.2.

Assessment of available resources and output

FIGURE 24
Agricultural land area
by land type in Poland
in 2023



The resource base is substantial but uneven. Agricultural land occupies almost 60% of Poland's surface area and forest a further 30%²¹. Farming decisions therefore shape the hydrological and ecological condition of most of the national territory. The geodetic category of agricultural land (about 18.6 million ha) is also broader than the utilised agricultural area reported by farm statistics (about 14.6 million ha).

This difference of over 4 million ha is a reserve that could be partly mobilised for extensive production, agroforestry or retention²².

Within this land base arable use dominates: sown area accounts for more than 75% of agricultural land, permanent meadows for more than 18%, permanent pastures and permanent crops for around 2% each²³. Permanent grassland is concentrated in river valleys and in north-eastern Poland, where it underpins the dairy and beef sectors^{24,25}, whereas permanent crops, despite their small area share, generate a disproportionately large part of production value²⁶ in the orchard belts of central Poland (Grójec-Warka) and the Lublin and Sandomierz regions²⁷.

21 GUS, Rocznik Statystyczny Rolnictwa 2025 (Statistical Yearbook of Agriculture 2025), Warsaw 2025, <https://stat.gov.pl/obszary-tematyczne/roczniki-statystyczne/roczniki-statystyczne/rocznik-statystyczny-rolnictwa-2025,6,19.html>

22 GUS, geodetic land-use statistics (Powierzchnia geodezyjna kraju według kierunków wykorzystania), as of 2025; see also GUS, Rocznik Statystyczny Rolnictwa 2025, Warsaw 2025, <https://stat.gov.pl/obszary-tematyczne/roczniki-statystyczne/roczniki-statystyczne/rocznik-statystyczny-rolnictwa-2025,6,19.html>

23 GUS, Rocznik Statystyczny Rolnictwa 2025 (Statistical Yearbook of Agriculture 2025), Warsaw 2025, <https://stat.gov.pl/obszary-tematyczne/roczniki-statystyczne/roczniki-statystyczne/rocznik-statystyczny-rolnictwa-2025,6,19.html>

24 J. Barszczewski et al., Stan i perspektywy wykorzystania trwałych użytków zielonych w Polsce, IUNG-PIB Studia i Raporty No. 17, Puławy 2009, <https://bc.iung.pl/server/api/core/bitstreams/e069da1d-fc38-4b11-8f90-459377b439c6/content>

25 GUS data, after: Portal Hodowcy, Plonowanie trwałych użytków zielonych w Polsce – potencjał, zróżnicowanie i wyzwania, <https://www.portalhodowcy.pl/czasopisma/107-aktualnosci/hodowca-bydla/6500-plonowanie-trwalych-uzytkow-zielonych-w-polsce-potencjal-zroznicowanie-i-wyzwania>

26 GUS, Polska w liczbach 2025 – Rolnictwo (interactive publication), <https://plwliczbach.stat.gov.pl/PL/rolnictwo.html>

27 ARiMR data, after: Sad24.pl, Połowa sadow w Polsce to „Grójec”. Gdzie rośnie druga połowa?, September 2025, <https://www.sad24.pl/sady/polowa-sadow-w-polsce-to-grojec-gdzie-rośnie-druga-polowa/>

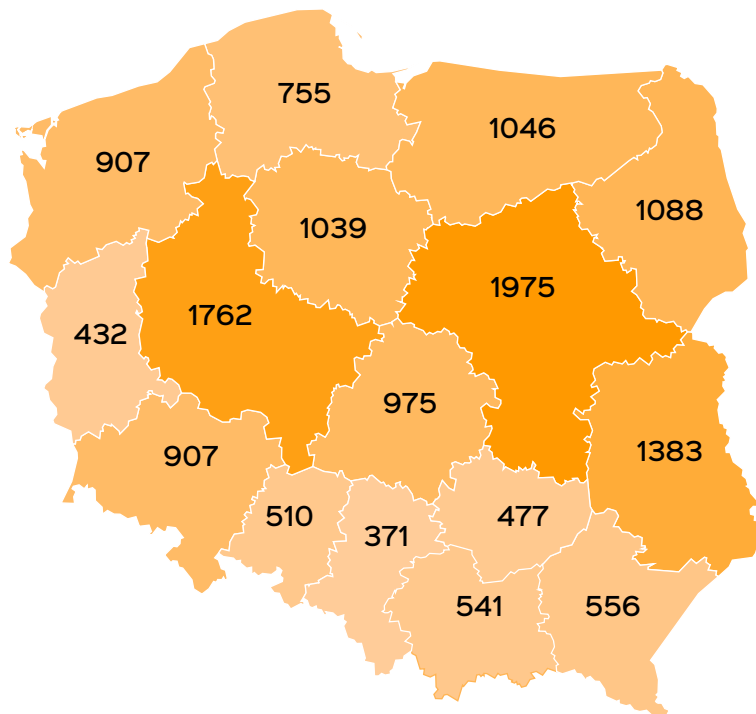
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Mazowieckie, Wielkopolskie and Lubelskie Voivodeships together account for more than one third of the national total, whereas more industrialised or mountainous southern regions, such as Śląskie, Lubuskie, Świętokrzyskie and Małopolskie, each hold much smaller agricultural areas. This spatial pattern corresponds closely to regional differences in average farm size, production specialisation and the potential for economies of scale.

Farm structure is where these territorial differences become an economic constraint. Average agricultural land per holding was 11.6 ha in 2024, ranging from 4.4 ha in Małopolskie to 33.5 ha in Zachodniopomorskie and far below German or French levels. Fragmentation weakens productivity and often makes irrigation, digital technologies, on-farm retention or renewable energy economically unfeasible. Poland is nevertheless experiencing a structural shift towards larger,

market-oriented holdings, although the process remains heavily regulated: while the vast majority of farms are small (below 10 ha), their aggregate area is declining as commercial enterprises scale up. Production is already highly polarised: the largest 10% of farms generate about half of agricultural output^{28,29}.

FIGURE 25
Area of agricultural land
by Voivodeship, 2023
(thousand ha)



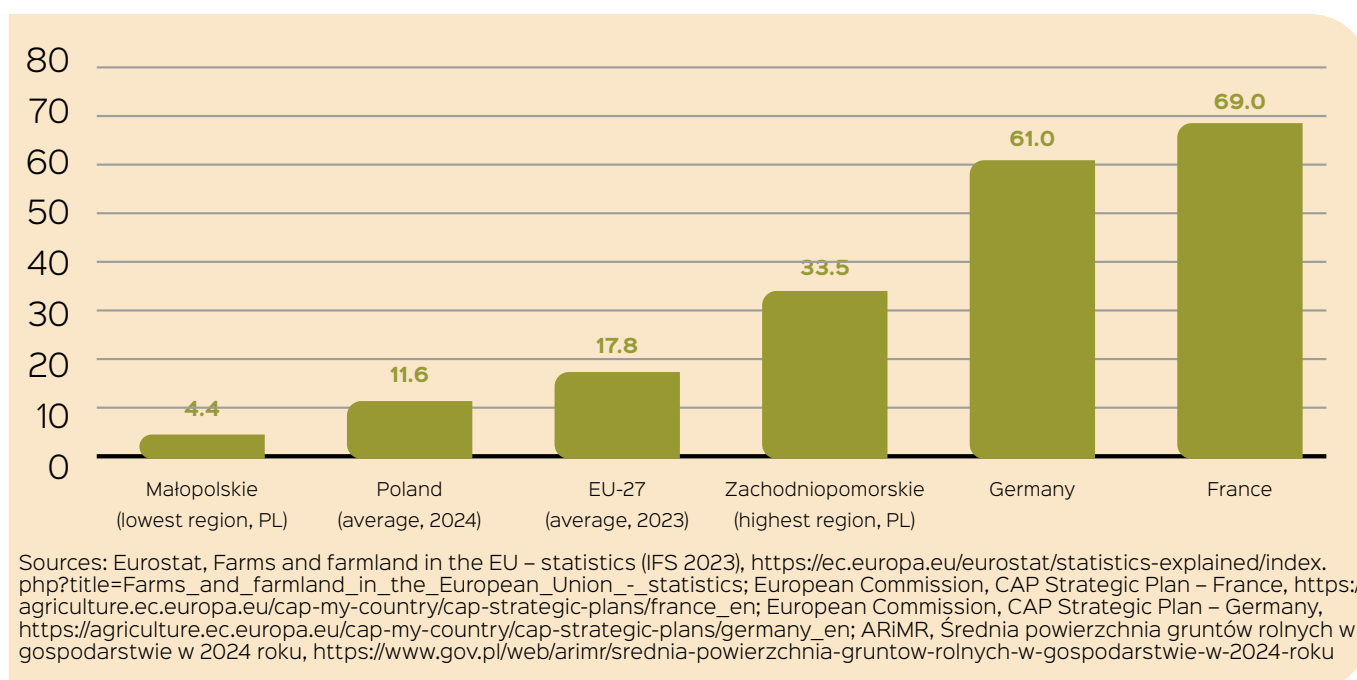
Source: GUS, Rocznik Statystyczny Rolnictwa 2025, Warsaw 2025, <https://stat.gov.pl/obszary-tematyczne/roczniki-statystyczne/roczniki-statystyczne/rocznik-statystyczny-rolnictwa-2025,6,19.html>

28 J. Olipra (senior economist, Credit Agricole Bank Polska), interview for PAP (Polish Press Agency), November 2023, Portal Spożywczy, Nieefektywne rolnictwo, 08.11.2023, <https://www.portalspozywczy.pl/technologie/wiadomosci/nieefektywne-rolnictwo-10-proc-gospodarstw-odpowiada-za-polowe-produkcji-w-polsce,239189.html> and Agropolska.pl, <https://www.agropolska.pl/agrobiznes/ekspert-duza-nieefektywnosc-polskiego-sektora-rolnego-musimy-przyspieszyc-proces-konsolidacji,1685.html>

29 IERiGŻ-PIB, Poziom nakładów inwestycyjnych w polskim rolnictwie, Warsaw 2026, farmer.pl, March 2026, <https://www.farmer.pl/prawo/nieruchomosci/otoczenie-srednia-powierzchnia-gospodarstwa-rolnego-w-polsce-nowy-raport,173988.html>

FIGURE 26

Average farm size:
Poland, EU, Germany,
France (ha per holding)



The composition of the sown area reveals a pronounced specialisation in cereals, which occupied 64.0% of the area sown in 2024, followed by fodder crops, industrial crops (chiefly rapeseed and sugar beet) and potatoes³⁰. Cereal-dominated rotations are particularly exposed to spring rainfall deficits (the drought pattern that has become most frequent in Poland) and constrain soil organic matter and biodiversity, while the marginal share of grain legumes per-

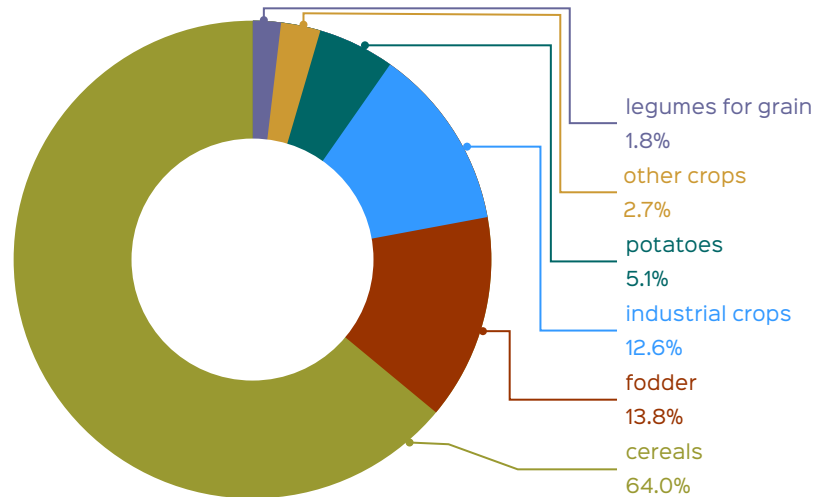
petuates dependence on imported soybean meal. Expanding domestic legume cultivation, supported by CAP eco-schemes and coupled payments, is therefore one of the clearest opportunities to improve rotations, soil condition and protein self-sufficiency at once.



³⁰ GUS, Użytkowanie gruntów i powierzchnia zasiewów w 2024 roku, Warsaw 2025, <https://stat.gov.pl/obszary-tematyczne/rolnictwo-lesnictwo/rolnictwo/uzytkowanie-gruntow-i-powierzchnia-zasiewow-w-2024-roku,8,20.html>

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FIGURE 27
The structure of the sown area in 2024 in Poland



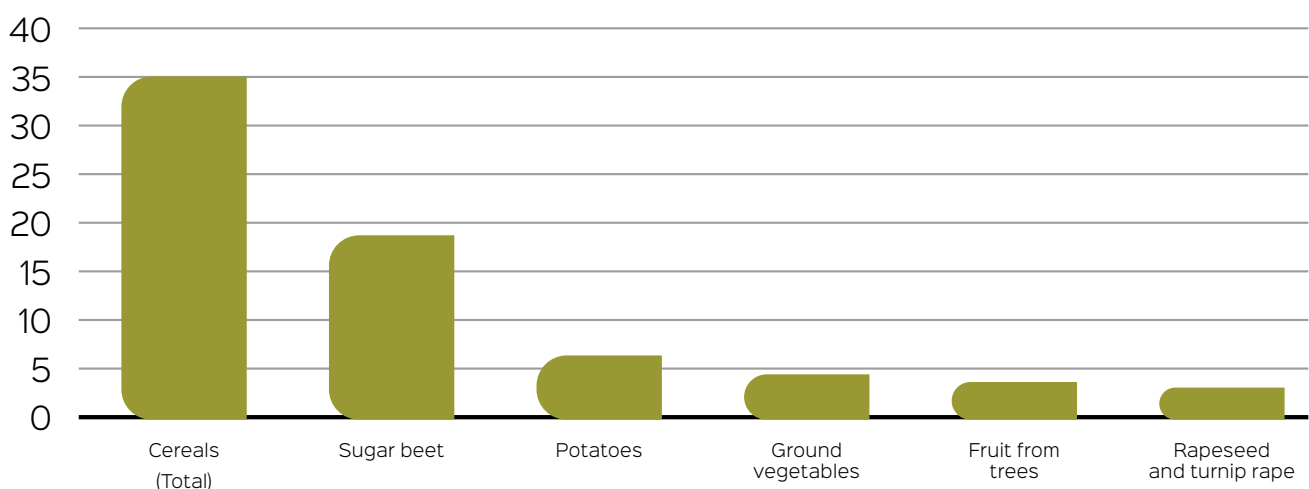
Source: <https://stat.gov.pl/obszary-tematyczne/rolnictwo-lesnictwo/rolnictwo/rolnictwo-w-2024-r,3,22.html>

Output in 2024 reflected both the strengths of this resource base and its climate exposure: cereal harvests reached about 35 million tonnes (-2.4% year-on-year),

rapeseed fell by some 12.6% to 3.3 million tonnes and fruit from trees by 14.4% to 3.7 million tonnes after spring frosts, while sugar-beet harvests rose by about 9% and

potatoes by about 6%³¹. Within a single season, 2024 thus combined frost damage in permanent crops with drought stress in spring-sown crops.

FIGURE 28
Harvests of the main crops in Poland in 2024 (million tonnes; cereals – total)



Source: <https://stat.gov.pl/obszary-tematyczne/rolnictwo-lesnictwo/uprawy-rolne-i-ogrodnicze/wynikowy-szacunek-glownych-ziemniopodow-rolnych-i-ogrodniczych-w-2024->

31 GUS, Wynikowy szacunek głównych ziemniopodów rolnych i ogrodniczych w 2024 roku, Warsaw, December 2024, <https://stat.gov.pl/obszary-tematyczne/rolnictwo-lesnictwo/uprawy-rolne-i-ogrodnicze/wynikowy-szacunek-glownych-ziemniopodow-rolnych-i-ogrodniczych-w-2024-roku,5,23.html>

The composition of output confirms an increasingly livestock-oriented profile. In 2024 animal products accounted for almost 63% of the value of market agricultural output and crop products for approximately 37%, with livestock for slaughter the largest single component (35.1% of market output, more than half of it poultry), followed by cow's milk, cereals and vegetables³². In gross agricultural output the split was 53.4% animal to 46.6% crop³³.

Livestock for slaughter, milk, cereals and vegetables together account for roughly three-quarters of national market output.

Procurement of livestock for slaughter reached almost 4 480 thousand tonnes (post-slaughter warm weight) in 2024, 4.1% more than in 2023, driven by poultry (+8.2%), while milk deliveries to dairies rose by 3.8% to 13.1 billion litres despite a shrinking cow herd³⁴.

Poland is the EU's third-largest milk producer after Germany and France³⁵ and a major exporter of dairy products, poultry meat and beef. Dairy and poultry are also among the most promising fields for Polish–Dutch technological cooperation, given Dutch expertise in precision livestock farming, feed efficiency and emissions management.

FIGURE 29
Structure of market
agricultural output
in Poland in 2024 (%)



Source: <https://stat.gov.pl/obszary-tematyczne/rolnictwo-lesnictwo/rolnictwo/rolnictwo-w-2024-r-,3,22.html>

32 GUS, Rolnictwo w 2024 r. / Agriculture in 2024, Warsaw 2025, Chart 2 (Struktura towarowej produkcji rolniczej w 2024 r. / Structure of market agricultural output in 2024), <https://stat.gov.pl/obszary-tematyczne/rolnictwo-lesnictwo/rolnictwo/rolnictwo-w-2024-r-,3,22.html>

33 GUS (Statistics Poland), Sytuacja społeczno-gospodarcza kraju w 2024 r. – Rolnictwo, Warsaw, 30.01.2025, <https://ssgk.stat.gov.pl/01.2025/Rolnictwo.html>

34 GUS (Statistics Poland), Sytuacja społeczno-gospodarcza kraju w 2024 r. – Rolnictwo, Warsaw, 30.01.2025, <https://ssgk.stat.gov.pl/01.2025/Rolnictwo.html>

35 Eurostat, Milk and milk product statistics, Statistics Explained, https://ec.europa.eu/eurostat/statistics-explained/index.php?title=Milk_and_milk_product_statistics

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3.3.

Identification of bottlenecks, barriers and needs

This section identifies six interlinked clusters of bottlenecks that both shape and constrain the capacity of Polish agriculture to become climate-resilient. Climate projections for Central Europe point to a further increase in the frequency of droughts, heat waves, and extreme precipitation events, meaning that the pressures described below are likely to intensify rather than diminish.





1. Soil quality and degradation

The natural starting point is comparatively weak. Light, sandy soils of low water-retention capacity predominate: the highest quality classes (I–II) account for only about 4% of arable land, while weak and very weak soils (classes V–VI) cover more than one-third³⁶. Degradation compounds this. Acid soils still account for around 60% of agricultural land, from about 35% in Opolskie to 76% in Podkarpackie, while national lime consumption covers only about one-third of estimated requirements³⁷. The nationwide liming programme launched in 2019 has begun to address the deficit, but soil organic matter continues to decline under narrow, cereal-dominated rotations³⁸, and the historic drainage of wetlands (an estimated 86% of Polish peatlands)

has further reduced landscape retention while turning organic soils into a source of greenhouse-gas emissions³⁹. Low-quality, acidified soils hold less water, respond more weakly to fertilisation and amplify every rainfall deficit. The corresponding needs are a large-scale liming programme, the systematic rebuilding of soil organic matter through catch crops and conservation and regenerative tillage and agroforestry and paludiculture pilots on rewetted peatlands.

2. Hydro-climatic hazards: drought, spring frosts and floods

Water scarcity is the sector's most acute climatic constraint. Nearly 40% of agricultural and forest land is classified as extremely or strongly exposed to agricultural drought, and more than 50% in the Odra basin⁴⁰. What was formerly a roughly five-yearly phenomenon has become an almost annual one: IUNG-PIB confirmed agricultural drought in each of the 2023, 2024 and 2025 growing seasons, with drought conditions in spring cereals again recorded in 2026^{41,42}. The damage is correspondingly large and recurrent (some 290 000 farmers filed damage claims after 2023 and over 170 000 after 2024^{43,44}) and the Polish Economic Institute estimates average annual drought losses at up to PLN 6.5 billion (EUR 1.5 billion)⁴⁵. Drought is only

36 IUNG-PIB soil-valuation data (arable soils of the highest quality classes I–II: ca. 4%; weak and very weak classes V–VI: over one-third of arable land); after: Zintegrowana Platforma Edukacyjna (Ministry of Education), <https://zpe.gov.pl/a/typy-gleb-wystepujace-w-poszczegolnych-klasach-bonitacyjnych/Dv84we9qp>

37 Wielkopolska Izba Rolnicza / KSOW, *Możliwości i bariery wykorzystania wapnowania gleb do poprawy efektywności nawożenia i potencjału plonowania roślin*, expert study, October 2022, https://wir.org.pl/asp/pliki/aktualnosci2023/ekspertyza_ksow_ver._z_dnia_07.10.2022r._wapnowanie.pdf

38 OSChR w Krakowie (District Agrochemical Station), *Oferta w zakresie badań środowiskowych w 2023 r.* <https://mir.krakow.pl/artykuly/Oferta-OSChR-w-Krakowie-w-zakresie-badan-srodowiskowych-w-2023-r.,14953.html>

39 PGW Wody Polskie, *Retencja dla rolnictwa*, <https://www.gov.pl/web/wody-polskie/retencja-dla-rolnictwa>

40 NIK (Supreme Audit Office), *Zapobieganie suszy rolniczej bez spójnego planu*, Warsaw 2021, <https://www.nik.gov.pl/aktualnosci/zapobieganie-suszy-rolniczej.html>

41 IUNG-PIB (Institute of Soil Science and Plant Cultivation – State Research Institute), *Agricultural Drought Monitoring System (SMSR)*, <https://www.iung.pl/2024/08/27/klimatyczny-bilans-wodny-od-21-czerwca-do-20-sierpnia-2024-roku/>; full series at <https://susza.iung.pulawy.pl>

42 IUNG-PIB, *Agricultural Drought Monitoring System (SMSR)*, <https://susza.iung.pulawy.pl>

43 <https://bip.brpo.gov.pl/pl/content/rpo-skargi-rolnicy-aplikacja-suszowa-mrwrw-odpowiedz>

44 <https://www.agropolska.pl/prawo-i-pieniadze/co-z-pomoca-suszowa-za-2024-r/>

45 Polski Instytut Ekonomiczny (Polish Economic Institute), *Gospodarcze koszty suszy dla polskiego rolnictwa*, Warsaw 2022, https://pie.net.pl/wp-content/uploads/2022/11/PIE_Gospodarcze-koszty-suszy-dla-polskiego-rolnictwa.pdf

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one element of a broader spectrum of hydro-climatic hazards. Late spring frosts have struck in three consecutive seasons: April 2024 frosts and May hail devastated orchards and berry plantations, cutting harvests of fruit from trees by more than 14% and triggering an extraordinary aid scheme of about PLN 470 million (EUR 107 million)^{46,47} and recurred in 2025 and 2026 with losses in some orchards reaching 80–90% of fruit buds⁴⁸. At the opposite extreme, the September 2024 flood inundated some 68 000 hectares of farmland, with the largest losses in Dolnośląskie and Opolskie⁴⁹. Public compensation has escalated accordingly: for the 2024 drought alone ARiMR operated three aid schemes in 2025, with per-hectare payments of PLN 1 000–3 000 (EUR 230–680) graduated by loss severity⁵⁰ and disaster payments disbursed in 2025 exceeded PLN 650 million (EUR 149 million) across the drought, flood and frost schemes⁵¹. Recurrent ad hoc

compensation is a substitute for prevention rather than a solution: total retention capacity remains at only a few percent of annual runoff, irrigation covers a marginal share of cropland and the Supreme Audit Office has assessed drought-prevention policy as dispersed and lacking a coherent plan⁵². The resulting needs, including small- and medium-scale retention, dual-function melioration, on-farm storage, efficient irrigation, frost protection in permanent crops and digital water management, are precisely the areas in which Dutch expertise is directly applicable.

3. Agrarian fragmentation, labour and generational renewal

The dual structure of Polish farming, a large number of small, undercapitalised holdings alongside a small number of large commercial farms, depresses average productivity. Agricultural employment is also inflated relative to the sector's economic size. Agriculture provides work for roughly 8% of the Polish workforce, while generating only about 2.5% of GDP, whereas a sector of this economic weight would normally require no more than around 5% of the workforce. Analysts estimate the difference at roughly 800 000 people – workers who are formally occupied on small family farms but whose labour contributes little additional output and who could leave the sector without production falling, a phenomenon known as hidden unemployment⁵³.

46 ARiMR, Pomoc kłękowa 2024, <https://www.gov.pl/web/arimr/pomoc-kleskowa-2024>

47 MRiRW, Wsparcie producentów rolnych poszkodowanych wskutek wiosennych przymrozków i gradobicia, September 2024, <https://www.gov.pl/web/rolnictwo/wsparcie-producentow-rolnych-poszkodowanych-wskutek-wiosennych-przymrozkiow-i-gradobicia>

48 MRiRW statement of April 2026, <https://www.farmer.pl/fakty/polska/mriw-sa-srodki-na-pomoc-dla-rolnikow-poszkodowanych-przez-przymrozki,176566.html>

49 MRiRW data (PAP), December 2024, <https://www.gov.pl/web/arimr/powodz-2024-szkody-w-gospodarstwie-rolnym>

50 ARiMR, Susza 2024: można składać wnioski o pomoc finansową, <https://www.gov.pl/web/arimr/susza-2024-mozna-skladac-wnioski-o-pomoc-finansowa>

51 MRiRW statement of April 2026, <https://www.farmer.pl/fakty/polska/mriw-sa-srodki-na-pomoc-dla-rolnikow-poszkodowanych-przez-przymrozki,176566.html>

52 NIK (Supreme Audit Office), Zapobieganie suszy rolniczej bez spójnego planu, Warsaw 2021, <https://www.nik.gov.pl/aktualnosci/zapobieganie-suszy-rolniczej.html>

53 J. Olipra (Credit Agricole Bank Polska), interview for PAP (Polish Press Agency), November 2023, <https://www.portalspozywczy.pl/technologie/wiadomosci/nieefektywne-rolnictwo-10-proc-gospodarstw-odpowiada-za-polowe-produkcji-w-polsce,239189.html> and Agropolska.pl, <https://www.agropolska.pl/agrobiznes/ekspert-duza-nieefektywnosc-polskiego-sektora-rolnego-musimy-przyspieszyc-proces-konsolidacji,1685.html>

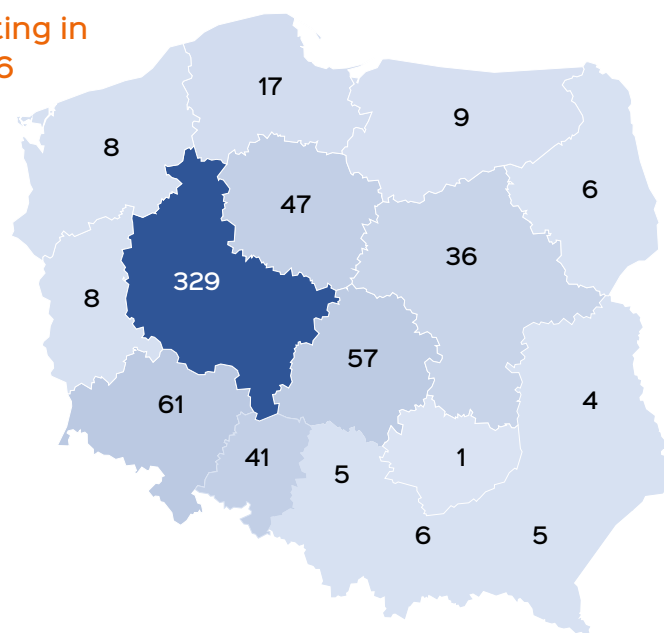


The demographic dimension aggravates the structural one. The rural population of working age is shrinking, successors for small holdings are increasingly difficult to find and uncertain generational renewal discourages precisely the long-horizon investments – in soil improvement, water retention or orchard renewal – on which climate adaptation depends. Small farm size further limits the economic feasibility of irrigation, renewable energy and precision agriculture and slows land consolidation⁵⁴. The key needs are an acceleration of structural change through land mobility, leasing and targeted support for young farmers, combined with mechanisms that give small holdings access to scale-dependent technologies.

4 Weak producer cooperation and value-chain position

Polish farmers remain among the least organised in the EU. Moreover, the number of registered producer groups has in fact declined in recent years. According to the Agency for Restructuring and Modernisation of Agriculture, there are currently 641 recognised groups operating in Poland, compared with 794 in 2025. Wielkopolskie alone accounts for around half of them, several times more than Dolnośląskie or Łódzkie, while Świętokrzyskie has a single group⁵⁵.

FIGURE 30
Agricultural producer groups operating in Poland in 2026



Source: <https://www.gov.pl/web/arimr/rejestr-grup-producentow-rolnych>

⁵⁴ IERiGŻ-PIB, Poziom nakładów inwestycyjnych w polskim rolnictwie, Warsaw 2026; farmer.pl, March 2026, <https://www.farmer.pl/prawo/nieruchomosci/oto-srednia-powierzchnia-gospodarstwa-rolnego-w-polsce-nowy-raport,173988.html>

⁵⁵ <https://www.gov.pl/web/arimr/rejestr-grup-producentow-rolnych>

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Two factors explain this concentration. Farms in Wielkopolska are on average larger, more specialised and more market-oriented, which strengthens the economic case for pooling supply and negotiating jointly. Producer groups nationally cluster in exactly the capital-intensive sectors in which the region specialises: pigs, cereals and oilseeds, milk and beef⁵⁶. The region also has an unusually deep tradition of rural self-organisation, rooted in the 19th-century “organic work” movement under the Prussian partition, which produced a dense network of agricultural circles, cooperative banks and trade cooperatives⁵⁷. The oldest continuously operating agricultural circle in Poland, founded in 1862, is located there. This culture of cooperation is widely credited with the higher propensity of Wielkopolska’s farmers to formalise collective action⁵⁸.

Forced collectivisation under the communist system left a durable distrust of formal cooperation. Producer organisations still account for only a minor share of national output, with the partial exception of dairy, where large farmer-owned cooperatives play a central role. The consequences are twofold. Economically, fragmented producers face concentrated processors and retail chains, which compresses farm-gate margins and therefore the funds available for adaptation^{59,60}. From a resilience perspective, weak cooperation forecloses precisely the collective solutions including joint retention investments, machinery rings, shared storage and drying, common insurance and coordinated marketing that would let small farms reach the scale adaptation technologies require. The corresponding needs comprise a revitalisation of producer groups

and cooperatives, support for water partnerships and contract-farming models in which processors co-finance on-farm adaptation.

5 Economic and financial constraints

Farm incomes are volatile. After two exceptionally profitable years in 2021–2022, real agricultural income fell in 2023–2024 as cereal and pig prices declined^{61,62}. This fall was driven primarily by global oversupply on world grain markets⁶³, compounded on the domestic market by increased grain and rapeseed inflows following the liberalisation of trade with Ukraine, which raised national grain stocks from about 3.8 million tonnes in mid-2021 to 9.7 million tonnes in mid-2023⁶⁴.

56 Ile mamy w Polsce grup producentów? Nowe statystyki ARiMR, <https://www.topagrar.pl/articles/polityka-rolna/ile-mamy-w-polsce-grup-producentow-nowe-statystyki-arimr-o-zrzeszaniu-sie-rolnikow-zaskakuja-2648974>

57 Praca organiczna, Region Wielkopolska, <https://regionwielkopolska.pl/artykuly-dzieje-wielkopolski/praca-organiczna/>

58 Wielkopolska Izba Rolnicza, Współpraca rolników na wielkopolskiej wsi – rola i znaczenie spółdzielczości, <https://wir.org.pl>

59 Instytut Finansów Publicznych, Ziarno niezgody: analiza protestów rolniczych, Warsaw, March 2024, <https://www.ifp.org.pl/ziarno-niezgody-analiza-protestow-rolniczych/>

60 J. Olipra (senior economist, Credit Agricole Bank Polska), interview for PAP (Polish Press Agency), November 2023, Portal Spożywczy, Nieefektywne rolnictwo, 08.11.2023, <https://www.portalspozywczy.pl/technologie/wiadomosci/nieefektywne-rolnictwo-10-proc-gospodarstw-odpowiada-za-polowe-produkcji-w-polsce,239189.html> and Agropolska.pl, <https://www.agropolska.pl/agrobiznes/ekspert-duza-nieefektywnosc-polskiego-sektora-rolnego-musimy-przyspieszyc-proces-konsolidacji,1685.html>

61 Eurostat, Performance of the agricultural sector, Statistics Explained (Economic Accounts for Agriculture, 2025 estimates; article updated 2026), https://ec.europa.eu/eurostat/statistics-explained/index.php?title=Performance_of_the_agricultural_sector

62 GUS (Statistics Poland), Sytuacja społeczno-gospodarcza kraju w 2024 r. – Rolnictwo, Warsaw, 30.01.2025, <https://ssgk.stat.gov.pl/01.2025/Rolnictwo.html>

63 Instytut Finansów Publicznych, Ziarno niezgody: analiza protestów rolniczych, Warsaw, March 2024, <https://www.ifp.org.pl/ziarno-niezgody-analiza-protestow-rolniczych/>

64 NIK (Supreme Audit Office), Działania organów państwa w zakresie importu i obrotu zboża i rzepaku z Ukrainy (audit report No. 101/2023/D/23/506/KRR), Warsaw 2023–2024, <https://www.nik.gov.pl/aktualnosci/import-zboza-z-ukrainy.html>

and only partially offset by lower input prices⁶⁵. Volatility of this kind, combined with the small scale of most holdings, translates into a persistent shortage of investment capital: many farms cannot finance retention basins, efficient irrigation or modern storage from their own resources and depend heavily on CAP payments and periodic state aid. Crop-insurance uptake remains low relative to risk exposure, so extreme-weather losses are largely socialised through ad hoc compensation, while an export basket dominated by low-processed products (about 60% of value) leaves margins thin⁶⁶. The needs are broader risk-management instruments (insurance and mutual funds), stable and predictable regulatory conditions, better access to investment finance for small and medium-sized farms, and an upgrading of the export structure towards higher-margin processed products.

6 Governance, knowledge and technology gaps

Competences for water management, drought prevention and climate adaptation are dispersed across ministries, Wody Polskie, local governments and water companies. This fragmentation is identified as a core reason for the absence of a consistent anti-drought policy⁶⁷. Advisory services and monitoring tools, such as the SMSR drought-monitoring system and satellite crop monitoring, exist but are not yet fully integrated into farm-level decision-making, while digitalisation and precision-agriculture adoption remain concentrated in the largest farms and leading processors⁶⁸. This governance gap acts as a multiplier of every other bottleneck. The resulting needs include integrated water and adaptation governance, knowledge transfer, demonstration farms, data-driven advisory services and pilot projects combining water technology with farm economics.

65 GUS (Statistics Poland), Sytuacja społeczno-gospodarcza kraju w 2024 r. – Rolnictwo, Warsaw, 30.01.2025, <https://ssgk.stat.gov.pl/01.2025/Rolnictwo.html>

66 KOWR (National Support Centre for Agriculture), Wyniki polskiego handlu towarami rolno-spożywczymi w 2024 r., based on preliminary data of the Ministry of Finance, <https://www.gov.pl/web/kowr/wyniki-polskiego-handlu-towarami-rolno-spozywczymi-w-2024-r>

67 NIK (Supreme Audit Office), Zapobieganie suszy rolniczej bez spójnego planu, Warsaw 2021, <https://www.nik.gov.pl/aktualnosci/zapobieganie-suszy-rolniczej.html>

68 IERiGŻ-PIB, Poziom nakładów inwestycyjnych w polskim rolnictwie, Warsaw 2026; farmer.pl, March 2026, <https://www.farmer.pl/prawo/nieruchomosci/oto-srednia-powierzchnia-gospodarstwa-rolnego-w-polsce-nowy-raport,173988.html>



4

**Governance
dynamics
and key
actors**

The agricultural sector in Poland is shaped by a multi-level governance system in which competences, budgets and knowledge are distributed among central government, its agencies, regional and local self-governments, EU institutions and sectoral organisations. This chapter describes decision-making and planning at the central level and at the regional and local level, analyses the important role of EU funds as the financial engine and steering instrument of agricultural policy and identifies the key stakeholders whose engagement determine the feasibility of climate-resilience measures and of Polish–Dutch co-operation.

4.1.

Central level decision-making and planning

Central decision-making is framed above all by European agricultural and climate policy. The Common Agricultural Policy (CAP) for 2023–2027, with its enhanced environmental conditionality, voluntary eco-schemes and the requirement that each Member State translate EU objectives into a national CAP Strategic Plan, is the single most important external framework shaping Polish agriculture. It is complemented by the EU climate framework – the European Climate Law, which sets the 2050 climate-neutrality objective and the 2030 emission-reduction targets, the EU Strategy on Adaptation to Climate Change and the European Green Deal agenda, including the Farm to Fork and Biodiversity strategies, whose objectives are reflected in the green architecture of the CAP.

The political framing of this agenda has, however, shifted markedly since 2024. In response to farmer protests and a stronger focus on competitiveness, the European Commission reframed the industrial dimension of the Green Deal as the Clean Industrial Deal⁶⁹ in February 2025 and, in the same month, replaced the Farm

69 European Commission (2025): The Clean Industrial Deal. https://commission.europa.eu/topics/competitiveness/clean-industrial-deal_en

to Fork Strategy with the Vision for Agriculture and Food⁷⁰, which prioritises simplification, farm incomes and competitiveness and has dropped or postponed several Farm to Fork initiatives. The climate-neutrality objective of the European Climate Law and the Biodiversity Strategy remain in force, but new sustainability requirements for agriculture are now more likely to come through incentives than through binding targets.

The Ministry of Agriculture and Rural Development (MRiRW) is the central policy-maker for the sector. It drafts agricultural legislation, negotiates Poland's position on the Common Agricultural Policy in Brussels and acts as the Managing Authority of the CAP Strategic Plan 2023–2027, responsible for its effective, efficient and correct implementation⁷¹. Strategic planning is anchored in a small set of framework documents: the CAP Strategic Plan itself, the Strategy for Sustainable Development of Rural Areas, Agriculture and Fisheries

2030 and, on the adaptation side, the national adaptation strategy documents and the Plan for Counteracting the Effects of Drought (PPSS) adopted under the Water Law. Climate-relevant competences, however, extend beyond MRiRW. The Ministry of Climate and Environment leads on climate and environmental policy, while water management is supervised by the minister responsible for water affairs and executed by the State Water Holding “Wody Polskie”, which issues water permits, manages flood and drought risk and runs the agricultural retention programmes⁷².

Implementation is delegated to specialised executive agencies. The Agency for Restructuring and Modernisation of Agriculture (ARiMR) is the accredited EU paying agency. It handles the applications of about 1.21 million farmers annually, administers direct payments, eco-schemes, investment support and drought-damage aid and maintains the farm register and land-parcel

identification system that together form the sector's key data infrastructure⁷³. The National Support Centre for Agriculture (KOWR) manages the state agricultural land stock (a strategic lever for farm consolidation), intervenes on agricultural markets and promotes Polish food abroad, including the analytical monitoring of agri-food trade⁷⁴. Sanitary, phytosanitary and quality supervision is exercised by the veterinary, plant-health and food-quality inspections (GIW, PIORiN, IJHARS). Scientific support for central decision-making is provided by state research institutes, notably IUNG-PIB in Puławy, which operates the Agricultural Drought Monitoring System used as the legal basis for drought-loss assessment⁷⁵, the Institute of Agricultural and Food Economics (IERiGŻ-PIB), the Institute of Technology and Life Sciences (ITP-PIB) for water and melioration issues and IMGW-PIB for meteorological services.

70 European Commission (2025): A Vision for Agriculture and Food. https://agriculture.ec.europa.eu/vision-overview/vision-agriculture-and-food_en

71 Ustawa z dnia 8 lutego 2023 r. o Planie Strategicznym dla Wspólnej Polityki Rolnej na lata 2023–2027 (Dz. U. z 2024 r. poz. 261, z późn. zm.), <https://isap.sejm.gov.pl/isap.nsf/download.xsp/WDU20230000412/T/D20230412L.pdf>

72 PGW Wody Polskie, Retencja dla rolnictwa, <https://www.gov.pl/web/wody-polskie/retencja-dla-rolnictwa>

73 ARiMR (Agency for Restructuring and Modernisation of Agriculture), Średnia powierzchnia gruntów rolnych w gospodarstwie w 2024 roku, <https://www.gov.pl/web/arimr/srednia-powierzchnia-gruntow-rolnych-w-gospodarstwie-w-2024-roku>

74 KOWR (National Support Centre for Agriculture), Wyniki polskiego handlu towarami rolno-spożywczymi w 2024 r., based on preliminary data of the Ministry of Finance, <https://www.gov.pl/web/kowr/wyniki-polskiego-handlu-towarami-rolno-spozywczymi-w-2024-r>

75 IUNG-PIB (Institute of Soil Science and Plant Cultivation – State Research Institute), Agricultural Drought Monitoring System (SMSR), communiqués on the Climatic Water Balance for the 2024 reporting periods; national average KBW of -79 mm in the tenth reporting period (21 June – 20 August 2024), <https://www.iung.pl/2024/08/27/klimatyczny-bilans-wodny-od-21-czerwca-do-20-sierpnia-2024-roku/>; full series at <https://susza.iung.pulawy.pl>

Governance dynamics and key actors



The national government uses this EU framework, and in particular EU funding, as an instrument to shape Polish agriculture. Through the design of the CAP Strategic Plan, MRiRW determines how EU money is converted into concrete incentives at farm level. Poland has dedicated roughly a quarter of its direct-payments envelope to eco-schemes rewarding, among others, carbon-farming practices, integrated plant production and improved nutrient management. Enhanced conditionality links full payment to soil-cover, crop-rotation and water-protection standards. Rural-development interventions channel investment support towards farm modernisation, water retention and irrigation, on-farm renewable energy and risk-man-

agement tools. These EU-financed instruments are complemented by purely national measures, subsidies to crop and livestock insurance premiums, ad hoc drought-damage aid and preferential disaster credit lines, which together define the economic incentives under which Polish farms adapt to a changing climate. Regional and local self-governments, in turn, shape the sector through the programming of EU cohesion funds and through spatial planning, as described in the following sections.

Internationally, the central level works along two tracks. The first is institutional and commercial. Within MRiRW, a dedicated Department of International Cooperation coordinates the ministry's bilateral and multilateral coopera-

tion and Poland's representation in the OECD, FAO and WTO⁷⁶. In practice most operational activity is directed outward, towards export promotion: MRiRW, KOWR, PAIH and the Ministry of Foreign Affairs jointly organise national stands at international trade fairs under the "Poland tastes good" brand, inbound missions for foreign importers and outbound business missions to priority markets. In September 2025 KOWR and PAIH signed a multi-annual agreement on the development of agri-food trade cooperation for 2025–2028⁷⁷. The orientation is towards market access and the diversification of export destinations, which follows logically from the trade surplus and the concentration on the single market described in chapter 3.

⁷⁶ MRiRW, Departament Współpracy Międzynarodowej, <https://www.gov.pl/web/rolnictwo/departament-wspolpracy-miedzynarodowej3>

⁷⁷ KOWR, Współpraca międzynarodowa, <https://www.kowr.gov.pl/en/promocja/wspolpraca-miedzynarodowa/>; on the KOWR–PAIH agreement of 9 September 2025 concerning the project 'Rozwój współpracy handlowej sektora rolno-spożywczego z zagranicą w latach 2025–2028' see <https://nowoczesnafarma.pl/KOWR-i-PAIH-lacza-sily-dla-rozwoju-eksportu-rolno-spozywczego.html>

The second track is the shaping of the European framework itself, where the government's positions are more defensive than expansionary. The most consequential file is the post-2027 CAP: the Commission's July 2025 proposal for the 2028–2034 Multiannual Financial Framework would end the two-pillar structure and fold agricultural spending into a single National and Regional Partnership Fund⁷⁸ and Poland has argued for a separate, ring-fenced CAP budget on the established model⁷⁹. Alongside this, Warsaw has pressed for proportionate environmental conditionality and administrative simplification, for safeguards on agricultural imports from Ukraine and on the terms of its eventual accession and for mirror requirements on imported products. The most visible expression of this defensive stance is Poland's opposition to the EU–Mercosur agreement⁸⁰. Together with France, Austria, Hungary and Ireland, Poland voted against it in the Council in January 2026, reflecting farmers' fears of competition from South American beef, poultry and sugar pro-

duced under less demanding standards. The agreement was nevertheless signed on 17 January 2026 and its trade part has been provisionally applied since May 2026, while the European Parliament has asked the Court of Justice of the EU for an opinion on its compatibility with the Treaties. What remains comparatively underdeveloped is the inbound dimension: the deliberate sourcing of foreign technology, capital and organisational models to address the structural weaknesses identified in section 3.3. Bilateral programmes such as the Polish–Dutch cooperation on soil quality and manure processing point in that direction but remain exceptions rather than a systematic policy.

Taken together, the central level combines strong programming and payment capacity with a structural weakness. Competences for water management and drought prevention are dispersed among several ministries, Wody Polskie, local governments and water partnerships and have not been integrated into one coherent,

consistently implemented plan⁸¹. For climate-resilience policy, which cuts across agriculture, water, environment and spatial planning, this fragmentation is the single most important governance constraint at the central level and any bilateral cooperation programme should be designed to work across, rather than within, these institutions.

78 European Commission, The CAP post-2027 and the next EU budget, https://agriculture.ec.europa.eu/common-agricultural-policy/cap-post-2027-next-eu-budget_en

79 MRIRW, Ruszyły prace nad nową Wspólną Polityką Rolną po 2027 roku, gov.pl, <https://www.gov.pl/web/rolnictwo/ruszyly-prace-nad-nowa-wpr-po-2027-roku>

80 Fleischhauer Corrêa da Costa, M. and Regazzoni, P. (2026), EU–Mercosur Trade Agreement: From Negotiations to Application, *Intereconomics*, 61(3), 149–153, <https://www.intereconomics.eu/contents/year/2026/number/3/article/eu-mercotur-trade-agreement-from-negotiations-to-application.html>

81 NIK (Supreme Audit Office), Zapobieganie suszy rolniczej bez spólnego planu, Warsaw 2021, <https://www.nik.gov.pl/aktualnosci/zapobieganie-suszy-rolniczej.html>

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4.2. Local-level decision-making and planning

Since the territorial reform in 1999 Poland has operated a three-level system of elected local self-government that delegates substantial decision-making power to the subnational level. The structure comprises 16 voivodeships, 380 counties and 2 479 municipalities, of which the large majority are rural or urban-rural – the level where most agricultural land and rural communities are located. For farmers, food processors and rural economy investors, this means that the conditions under which a farm can expand or agricultural land can be protected from conversion are not set by central government alone but are shaped, in large part, by decisions taken in the local town hall.

The municipality is the pivotal tier for agriculture. Its directly elected council and executive are responsible for local spatial planning, local environmental protection, water-and-sewage and waste management as well as the development decisions that determine where agricultural, processing and energy installations may be located. The powiat handles a narrower set of supra-municipal tasks, including certain environmental and water-permit functions and land registry, while the voivodeship

self-government is responsible for regional development strategy, the modernisation of rural areas, regional spatial planning and crucially the programming of a large share of EU rural-development and cohesion funds. Centrally appointed voivode supervises the legality of local acts. Under this layered structure, planning permission, environmental clearance, grid and water permits and access to EU co-financing may each be decided by a different authority at a different level.

Two further features of local-level decision-making are worth underlining. First, the fragmentation of the municipality level mirrors the division of Polish farm structure. A large number of small rural municipalities, often with limited technical and financial capacity, must each take planning, environmental and investment decisions that affect agriculture, which makes inter-municipal cooperation, advisory support and shared expertise especially valuable. Second, the local self-government bodies are not only regulators but also direct beneficiaries and co-implementers of EU support. Municipalities and their associations are explicitly named among the eligible recipients under the CAP Strategic Plan

and cohesion programmes, linking local governance directly to the EU funding architecture⁸².

4.3.

Role of EU funds

Since joining the EU, Poland has benefited from significant funds from the EU budget. According to the Ministry of Finance, from 2004 to the end of 2023, Poland received a gross amount of EUR 245.5 billion from the EU⁸³. Three distinct streams matter for climate-resilient agriculture: the Common Agricultural Policy (CAP), cohesion policy (the European structural and investment funds) and the temporary Recovery and Resilience Facility. Together these instruments shape not only farm incomes but also the financing available for irrigation, renewable energy, environmental protection and rural infrastructure.

Since 2004, around EUR 67 billion has flowed to Polish agriculture and rural areas under the Common Agricultural Policy⁸⁴. The CAP is delivered in Poland through the national CAP Strategic Plan for 2023–2027, approved by the European Commission on 31 August 2022. Its total budget exceeds 25 billion euro of public expenditure for the period, of which the EU contributes roughly 22



⁸² European Commission, Directorate-General for Agriculture and Rural Development, CAP Strategic Plan for Poland 2023–2027, country page, https://agriculture.ec.europa.eu/cap-my-country/cap-strategic-plans/poland_en

⁸³ Ministerstwo Finansów, Transfery finansowe Polska – budżet UE, gov.pl, monthly statement, data as at [month/year of the table used], <https://www.gov.pl/web/finanse/transfery-polska-ue-unia-europejska>

⁸⁴ Eurostat national accounts data, after: Instytut Finansów Publicznych, 20 lat polskiego rolnictwa w UE. Perspektywa makroekonomiczna, Warsaw 2024, <https://www.ifp.org.pl/20-lat-polskiego-rolnictwa-w-ue-perspektywa-makroekonomiczna-wybrane-fakty/>

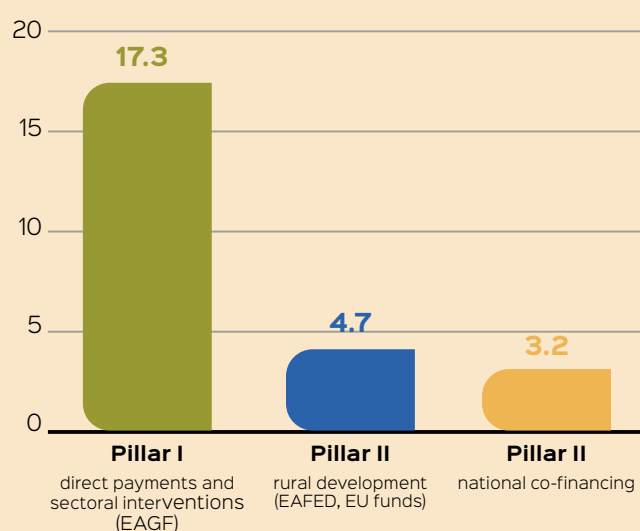
Governance dynamics and key actors

billion euro. National funding constitutes around 3 billion euro. Altogether, this gives nearly EUR 8 billion of public funds for rural development alone⁸⁵.

The plan funds basic income support (around 8 billion euro, with an estimated basic rate of about 118 euro per hectare), a redistributive payment of roughly 40 euro for each of a farm's first 30 hectares (about 2 billion euro in total) that deliberately favours small and medium farms up to 30 hectares, coupled support for sectors in difficulty (livestock, protein crops, sugar beet, starch potatoes, fruit and vegetables, hops, flax and fibre hemp) and support for young farmers⁸⁶.

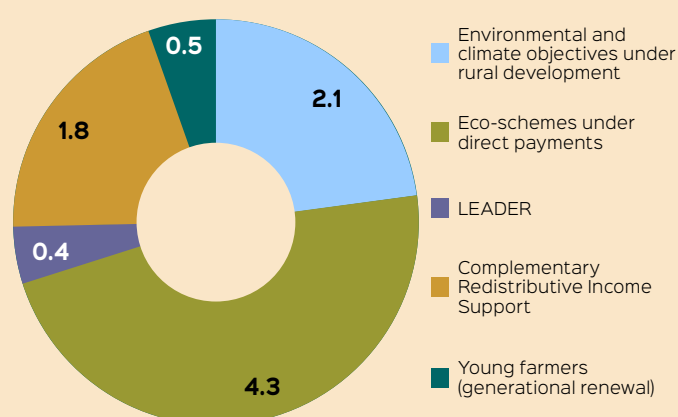
Alongside the CAP, cohesion policy provides a second major channel. Under the Partnership Agreement for 2021–2027, adopted by the Commission in 2022, Poland is allocated 76.5 billion euro⁸⁷. These funds, drawn from the European Regional Development Fund, the Cohesion Fund, the European Social Fund Plus and the Just Transition Fund, are delivered through national programmes and 16 regional programmes (one per voivodeship), placing a

FIGURE 31
Budget of the CAP
Strategic Plan
for Poland 2023–2027
(EUR bin)



Source: own elaboration based on the Ustawa z dnia 8 lutego 2023 r. o Planie Strategicznym dla Wspólnej Polityki Rolnej na lata 2023–2027 and on data of the National Rural Network (KSOW).

FIGURE 32
EU funding reserved for
specific objectives, Poland,
CAP Strategic Plan
2023–2027 (EUR billion)



Source: European Commission, Directorate-General for Agriculture and Rural Development, CAP Strategic Plan at a glance: Poland 2023–2027, https://agriculture.ec.europa.eu/document/download/7716493a-28a0-4a7c-a66d-e54803e42bdd_en?filename=csp-at-a-glance-poland_en.pdf

85 KSOW (National Rural Network), WPR 2023–2027 – budget of the CAP Strategic Plan for Poland, <https://ksow.pl/wspolna-polityka-rolna/wpr-2023-2027>

86 European Commission, Directorate-General for Agriculture and Rural Development, CAP Strategic Plan at a glance: Poland 2023–2027, Brussels, https://agriculture.ec.europa.eu/document/download/7716493a-28a0-4a7c-a66d-e54803e42bdd_en?filename=csp-at-a-glance-poland_en.pdf

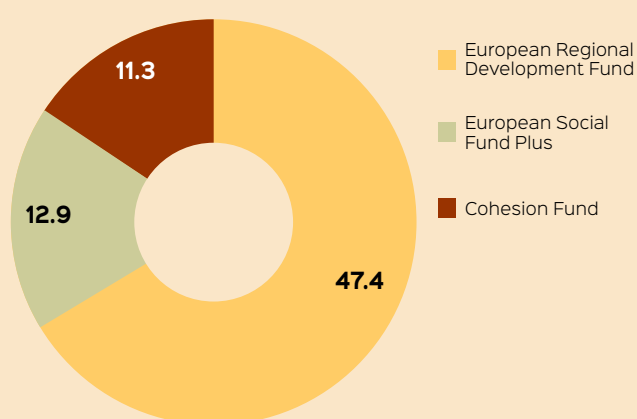
87 Ministerstwo Funduszy i Polityki Regionalnej, Umowa Partnerstwa dla realizacji polityki spójności 2021–2027 w Polsce, Warsaw 2022, https://www.fundusze-unijne.gov.pl/media/109763/Umowa_Partnersstwa_na_lata_2021_2027.pdf

substantial share of investment decisions in the hands of the voivodeship self-governments. The package allocates around 17.9 billion euro for renewable energy and the circular economy and roughly 3.9 billion euro through the Just Transition Fund for the five coal-affected region. These funding streams directly finance the energy, water and environmental infrastructure on which a climate-resilient rural economy depends. A further 512 million euro from the European

Maritime, Fisheries and Aquaculture Fund supports the fisheries and aquaculture sector's green transition.

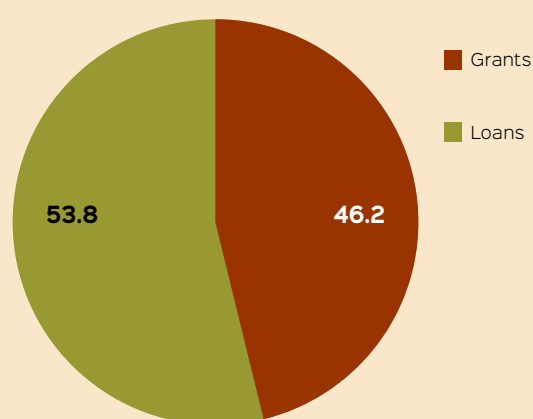
The third stream is the Recovery and Resilience Facility, under which Poland's National Recovery Plan (Krajowy Plan Odbudowy, KPO) amounts to 54.7 billion euro in grants and loans. Disbursement was delayed for an extended period because of rule-of-law conditionality and was substantially unblocked only in 2024, after which the facility became a significant additional source for green-transition, energy and agri-food investments,

FIGURE 33
EU funding allocated to Poland under the 2021–2027 Partnership Agreement (EUR billion)



Source: Ministerstwo Funduszy i Polityki Regionalnej, Umowa Partnerstwa dla realizacji polityki spójności 2021–2027 w Polsce, Warsaw 2022, https://www.funduszeunijne.gov.pl/media/109763/Umowa_Partnerstwa_na_lata_2021_2027.pdf

FIGURE 34
Poland's National Recovery and Resilience Plan



Source: European Parliamentary Research Service (EPRS), Poland's National Recovery and Resilience Plan, Briefing PE 733.665, Brussels 2022, [https://www.europarl.europa.eu/RegData/etudes/BRIE/2022/733665/EPRS_BRI\(2022\)733665_EN.pdf](https://www.europarl.europa.eu/RegData/etudes/BRIE/2022/733665/EPRS_BRI(2022)733665_EN.pdf)

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including support for short supply chains, local processing and on-farm energy. The facility devotes 40.3% of the funds to the green transition and 13% to the digital transition. Due to its time-limited and milestone-driven nature, it operates on shorter timelines and under different rules from cohesion and CAP funding, which adds a layer of complexity for beneficiaries who must navigate several parallel programmes at once.

It is important to emphasize two points. Firstly, the governance of EU funds in Poland is multi-level: the CAP's direct payments and many national interventions are administered centrally (through the Agency for Restructuring and Modernisation of Agriculture and the National Support Centre for Agriculture), while a large part of cohesion and rural-development spending is programmed and disbursed by the voivodeship self-governments and municipalities act as both beneficiaries and local implementers. This makes effective coordination across levels a precondition for translating EU money into climate-resilient outcomes on the ground. Secondly, the sheer scale of available funding – over EUR 100 billion across the three

streams for the current period – represents a substantial opportunity for Polish-Dutch cooperation. Dutch expertise in water management, horticulture, precision and circular agriculture and the bioeconomy can be matched to Polish programmes that are explicitly designed to finance exactly these transitions, provided that local and regional administrative capacity is sufficient to absorb the funds.



4.4.

Structure and dynamics of key actors in the agrifood value chain

Poland's agrifood value chain is shaped by a multilayered governance system in which public institutions set the rules and redistribute funds, while private actors including farmers, cooperatives, processors and retailers, determine production, processing, and final distribution. The chain is increasingly concentrated at the retail and processing stages, while farm-level fragmentation and weak bargaining power keep many producers vulnerable to price and cost pressures.

farms can afford irrigation, precision technology or on-farm energy. KOWR's management of state land is the principal lever available for consolidation and therefore for farm scale. Local authorities decide, through spatial planning and water and grid permits, where processing, storage and energy installations may actually be built. Public bodies are thus not an external framework around the chain but one of the actors that shapes its structure.

1. Public institutions and governance bodies

The public institutions that set the rules and redistribute funds including the Ministry of Agriculture and Rural Development as policy-maker and Managing Authority of the CAP Strategic Plan, ARiMR as the accredited paying agency, KOWR as manager of the state land stock and market and promotion body and the voivodeship and municipal self-governments are described in sections 4.1 and 4.2. What matters for the value chain is the leverage they exercise over it. ARiMR's investment and modernisation measures determine which

2. Primary producers: farmers and their organisations

Polish agriculture is characterised by a dual structure – a large number of small and medium-sized family farms alongside a growing segment of large-scale holdings. The average farm size reached 11.75 ha in 2025, but the distribution is highly skewed. Holdings below 5 ha make up around half of all farms yet work only about a tenth of the utilised agricultural area, while a smaller but expanding group of farms above 100 ha accounts for a disproportionate share of marketed output⁸⁸. These large farms have emerged

⁸⁸ <https://www.gov.pl/web/arimr>; <https://www.farmer.pl/prawo/nieruchomosci/oto-srednia-powierzchnia-gospodarstwa-rolnego-w-polsce-nowy-raport,173988.html>

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as important producers of cereals, oilseeds and live-stock, often operating on former state-farm land now managed through the National Support Centre for Agriculture (KOWR) and achieving economies of scale that improve their resilience to price volatility and input-cost shocks.

Despite their productive role, many Polish farmers face tight margins. In 2025, analyses by the Wielkopolska Chamber of Agriculture (WIR) showed that arable farms in the region often operated at a loss on a per-hectare basis: grain maize generated persistent losses of roughly PLN 2300–3600/ha (EUR 525–822/ha); spring barley also recorded losses, deepening from around PLN 400/ha (EUR 90/ha) in January to over PLN 1400/ha (EUR 320/ha) by year-end and consumption wheat, only marginally profitable in the first half of the year (around PLN 196–199/ha (EUR 45/ha)), turned negative by December (–PLN 604/ha (–EUR 138.00/ha)). Rape-seed was the only major crop to remain mostly profitable,

with margins of about PLN 1000–1100/ha, though profitability declined in the second half of the year⁸⁹.

These results reflect a broader cost–price squeeze. Between May 2025 and May 2026, prices of key agricultural inputs rose by approximately 7.3% while the basket of farm-gate prices fell by 15.3%, leaving the cumulative price-scissors index at 81.4 points – one of the least favourable readings in many years. GUS reported that procurement prices in the first half of 2026 were about 11.5% lower than in the preceding half-year, confirming the sharp pressure on farm revenues⁹⁰. Because many costs are largely fixed in the short run and farm-gate prices are set by buyers including processors, traders and retailers, the adjustment falls primarily on farm margins.

Public transfers absorb much of this gap. Various payments (CAP direct payments, rural-development support and other transfers) account for about 35% of the income of Polish farming house-

holds, while agricultural production itself provides under 60%. Low profitability is the barrier to farm development that farmers themselves cite most often, limiting investment in climate-resilient technologies, irrigation and environmental measures⁹¹.

To counteract weak individual bargaining power, farmers organise into agricultural producer groups and cooperatives. These enable joint marketing, standardisation of quality, bulk purchasing of inputs and better access to finance and information, thereby improving members' position in the value chain. Their reach in Poland nonetheless remains limited. In 2026 only around 640 recognised agricultural producer groups were operating, concentrated mainly in Wielkopolska and in the pig, cereal and milk sectors⁹².

Cooperatives are strongest in the dairy sector, where large cooperative processors such as Mlekpól and Mlekovita function simultaneously as farmer organisations and industrial players. They col-

89 Wielkopolska Izba Rolnicza, Podsumowanie 2025 roku w rolnictwie – część 1, Poznań, 2026, <https://wir.org.pl/asp/podsumowanie-2025-roku-w-rolnictwie-czesc-1,1,artykul,1,5820>

90 GUS (Statistics Poland), <https://stat.gov.pl/sygnalne/komunikaty-i-obwieszczenia/lista-komunikatow-i-obwieszczen/>; Ceny zbóż najniższe od 18 lat, w tym czasy nawozy podrożały o 184%, <https://www.cenyrolnicze.pl/wiadomosci/wiesci-rolnicze/pozostale-wiesci-rolnicze/43244-ceny-zboz-najnizsze-od-18-lat-w-tym-czasie-nawozy-podrozaly-o-184>

91 Ministerstwo Rolnictwa i Rozwoju Wsi / KRUS, Polska wieś i rolnictwo, gov.pl, <https://www.gov.pl/web/krus/polska-wies-i-rolnictwo>

92 ARiMR (Agencja Restrukturyzacji i Modernizacji Rolnictwa), Rejestr grup producentów rolnych, <https://www.gov.pl/web/arimr/rejestr-grup-producentow-rolnych>

lect milk from thousands of member farms (Mlekpól from roughly 14 thousand suppliers, accounting for over 14% of national milk purchases and Mlekovita from some 6 thousand members), set the prices paid to those suppliers and invest in processing capacity, thereby playing a system-defining role in the dairy value chain. This cooperative model, largely confined to dairy within the Polish food industry, gives milk producers a degree of downstream integration that farmers in other sectors do not have⁹³.

3. Food processing industry

The food processing sector is the main link between primary production and retail. In 2026, the food product manufacturing industry in Poland is estimated at €73.4 billion, with over 21 900 enterprises and moderate but decreasing competition⁹⁴. The sector is highly fragmented. No single company holds more than 5% market share, but a few

large groups dominate specific subsectors (dairy, meat, beverages, confectionery).

A closer look at the leading companies in Poland illustrates both the scale and the strategic direction of Polish food processing industry. The largest food producer, Maspex Group (revenue of about PLN 16 billion (EUR 4 billion) in 2024), makes juices, beverages, pasta and ready meals and exports to more than 80 countries⁹⁵. The farmer-owned dairy cooperatives Mlekovita and Mlekpól, Poland's two largest dairy processors, with Mlekovita's revenue exceeding PLN 10 billion (EUR 2.3 billion), combine industrial scale with cooperative milk supply from thousands of member farms and export across Europe, Asia and Africa⁹⁶. Among the biggest companies in Poland, there is a relatively high number of companies producing meat products, many of them focusing on poultry e.g., Superdrob, Tarczyński, Drosed, as this is the sector

that has developed tremendously during recent years⁹⁷. The meat sector is led by vertically integrated groups such as Animex Foods (pork and poultry, with a turnover of roughly PLN 11.5 billion (EUR 2.6 billion))⁹⁸ and Sokołów⁹⁹.

These companies face a common set of challenges: high and volatile energy costs and the need to modernise and decarbonise processing, margin pressure from retailers' private-label tenders, tightening EU packaging, reporting and due-diligence requirements and, upstream, the task of securing a stable, climate-resilient raw-material base. The sector's modernisation agenda accordingly centres on automation and energy efficiency, on-site renewables, water reuse and closer, longer-term contractual integration with primary producers.

93 <https://www.wrp.pl/mlekpól-najwieksza-spółdzielnia-mleczarska-w-europie-srodkowo-wschodniej/>

94 <https://www.ibisworld.com/poland/industry/food-product-manufacturing/200030/>

95 Maspex Group, O firmie, <https://maspex.com/o-firmie>; PAP Biznes, Grupa Maspex uruchomiła centrum dystrybucyjno-logistyczne w Tymbarku, 2025, <https://biznes.pap.pl/wiadomosci/firmy/grupa-maspex-uruchomila-centrum-dystrybucyjno-logistyczne-w-tymbarku>

96 Wiadomości Handlowe, Mlekovita ma ponad 10 mld zł przychodu, 17.07.2025, <https://www.wiadomoscihandlowe.pl/przemysl-i-produkcji/mlekovita-ma-ponad-10-mld-zl-przychodu-kluczem-jest-elastycznosc-2527304>; dlahandlu.pl, Historyczny rekord polskiego mleczarstwa, 2026, <https://www.dlahandlu.pl/detal-hurt/historyczny-rekord-polskiego-mleczarstwa-mlekovita-przebila-10-mld-zl,172331.html>; Wprost, Złota 100 Polskiego Rolnictwa, 2024 edition, <https://zlota100.wprost.pl/edycja/2024/po-raz-osmy-wybrano-gigantow-polskiego-rolnictwa-czolowka-zaskakuje.html>

97 <https://rankingi.rp.pl/lista500/2024>

98 Animex Foods, financial statements filed with the National Court Register, <https://www.bizraport.pl/krs/0000471961/animex-foods-spolka-z-ograniczona-odpowiedzalnoscia>; Animex Foods, Get to know us, <https://www.animex.pl/en/get-to-know-us/>

99 Sokołów S.A., corporate website, <https://sokolowska.pl/en/company>

Governance dynamics and key actors

FIGURE 35
Composition of the
largest agricultural-sector
companies in Poland by
branch (product group)

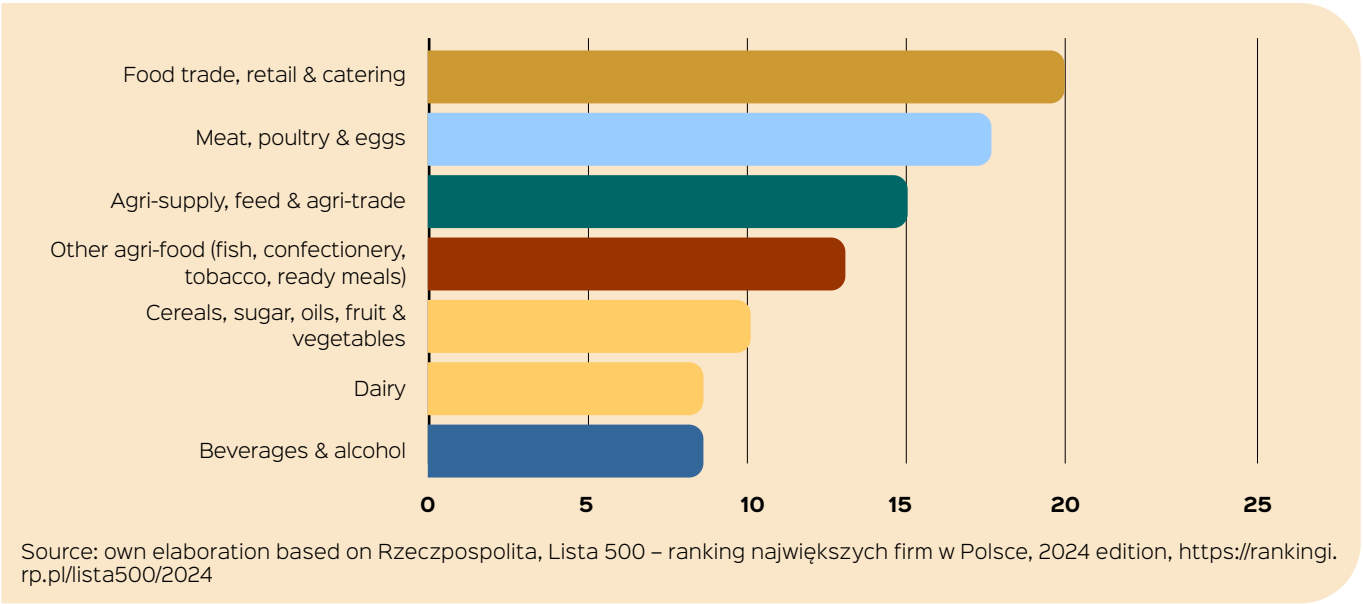
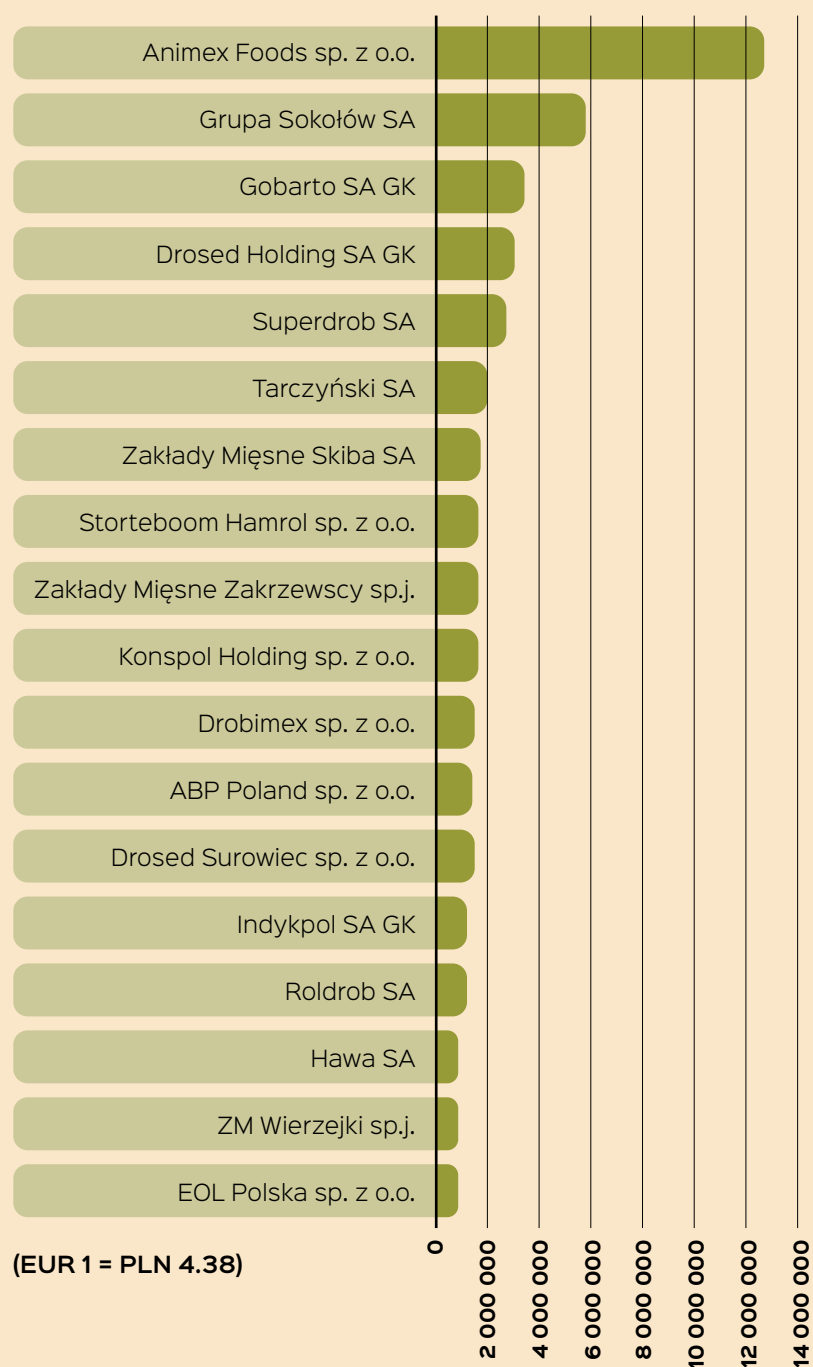


FIGURE 36

Largest meat, poultry and egg companies in Poland, 2023 (revenue, PLN)



Source: own elaboration based on Rzeczpospolita, Lista 500 – ranking największych firm w Polsce, 2024 edition, <https://rankingi.rp.pl/lista500/2024>

Key roles of the food processing industry in the value chain include:

- » Market power and price formation: Processors negotiate purchase prices with farmers and producer groups, often dictating quality and delivery terms. Their bargaining position is stronger than that of individual small farms but weaker than that of large retail chains¹⁰⁰
- » Value addition and standards: Processors add value through transformation, packaging, branding and compliance with food safety and sustainability standards, which are increasingly important for export markets and climate-related criteria
- » Investment and innovation: Large processors and cooperatives (e.g. dairy cooperatives like Mlekpól, Mlekovita) invest in energy efficiency, wastewater treatment, and product innovation, thereby shaping the environmental footprint of the value chain

¹⁰⁰Skrzypczyk, M. (2024), Concentration Processes in the Retail and Meat Processing Industry in Poland and Competitive Relationships in the Food Chain, Food and Agriculture Organization of the United Nations,

Governance dynamics and key actors

4. Wholesale and logistics

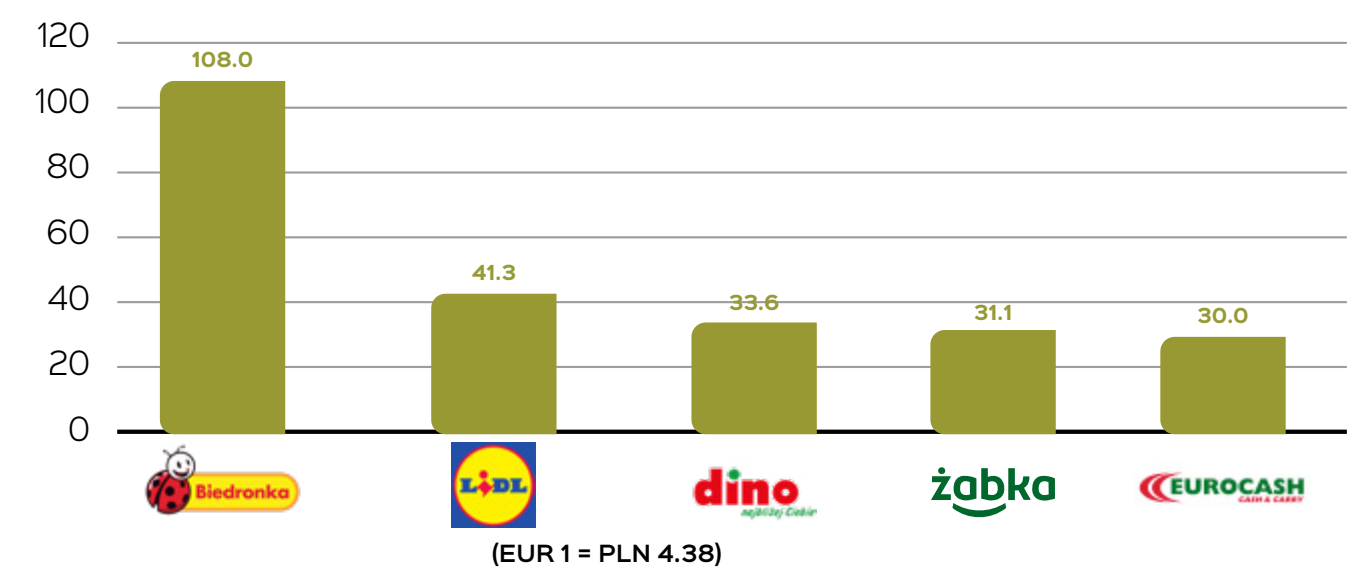
Wholesalers and logistics operators coordinate the physical flow of goods from farms and processors to retail and food service. While less visible in public debate, they are critical for aggregating supply from many small producers, especially in fruit and vegetables as well as providing cold chain and storage infrastructure that reduces post-harvest losses and enables year-round supply. Their role is likely to grow in importance as climate resilience requires more flexible, diversified and efficient logistics (e.g. to manage climate-induced yield variability).

5. Retail sector: discount chains and the changing balance of power

Food retail in Poland is highly concentrated, with a small number of discount and supermarket chains accounting for most of household food purchases and exercising strong bargaining power over processors and, indirectly, over farmers. Biedronka, with almost 3 900 stores and 2025 revenue of about PLN 108 billion (around EUR 25 billion) – more than Dino, Żabka and Carrefour Polska combined – is by far the largest food buyer in Poland¹⁰¹. It is followed by Lidl (revenue of about PLN 41 billion (EUR 9 billion)),

the rapidly expanding small-town chain Dino (over 3 000 stores) and the convenience network Żabka (over 12 300 outlets), while an intense price war between the leading chains keeps consumer prices, and hence margins along the whole chain, under continuous pressure¹⁰². Both Dino and Żabka reported revenue growth of more than 14% in 2025 compared with 2024. Over the course of the year, Żabka opened 1 394 new stores.

FIGURE 37
Five largest food retail chains in Poland, 2025 (PLN bn)



Source: Next.gazeta.pl, Pięć największych sieci spożywczych w Polsce – ranking gigantów, 2025. <https://next.gazeta.pl/next/7,151003,32910547,pienc-najwiekszych-sieci-spozywczych-w-polsce-ranking-gigantow.html>

101 Pięć największych sieci spożywczych w Polsce – ranking gigantów, Next.gazeta.pl, <https://next.gazeta.pl/next/7,151003,32910547,pienc-najwiekszych-sieci-spozywczych-w-polsce-ranking-gigantow.html>

102 Pięć największych sieci spożywczych w Polsce – ranking gigantów, Next.gazeta.pl, <https://next.gazeta.pl/next/7,151003,32910547,pienc-najwiekszych-sieci-spozywczych-w-polsce-ranking-gigantow.html>

Concentration in retail has increased markedly. The combined market share of the four largest retailers has risen rapidly, shifting the market from highly competitive to a loose oligopoly. This gives retailers significant bargaining power over processors and, indirectly, over farmers, allowing them to influence prices, product specifications, and private-label strategies. Retailers also increasingly set sustainability and climate-related requirements for suppliers (e.g. packaging, carbon footprint, animal welfare), which can either drive or constrain climate-resilient practices upstream¹⁰³.

6 Consumers, civil society and informal actors

While not formal governance actors, consumers and civil society organisations increasingly shape value-chain dynamics:

- » Consumer preferences: Price sensitivity remains high, but there is growing demand for quality, convenience and, among some segments, more sustainable and locally sourced products. The plant-based food retail market, though still small, grew rapidly (sales up 109% between 2020 and 2022, reaching PLN 729 million (EUR 167 million))¹⁰⁴
- » Food cooperatives and grassroots initiatives: Informal food cooperatives connect consumers directly with local (often organic or regenerative) producers, embodying “farm-to-fork” principles and supporting environmentally sound agriculture¹⁰⁵
- » NGOs and think tanks: Organisations and local policy institutes contribute to debates on sustainable food systems, green public procurement and climate adaptation in agriculture



¹⁰³ Skrzypczyk, M. (2024), Concentration Processes in the Retail and Meat Processing Industry in Poland and Competitive Relationships in the Food Chain, Food and Agriculture Organization of the United Nations, <https://agris.fao.org/search/en/providers/122436/records/67597e1fc7a957febdf8f05a>

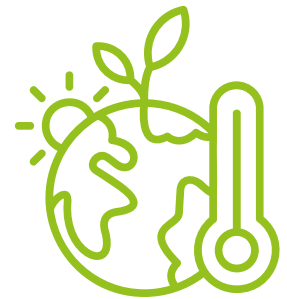
¹⁰⁴ The Good Food Institute Europe, Poland retail market insights 2020–2022, 2023, <https://gfi-europe.org/wp-content/uploads/2023/04/2020-2022-Poland-retail-market-insights-1.pdf>

¹⁰⁵ Heinrich-Böll-Stiftung Warszawa, Kooperatywy spożywcze w UE, 24 April 2023, <https://pl.boell.org/en/2023/04/24/kooperatywy-spozywcze-w-ue>



5

**Climate
change
influence
on Polish
agriculture**



Climate change influence on Polish agriculture

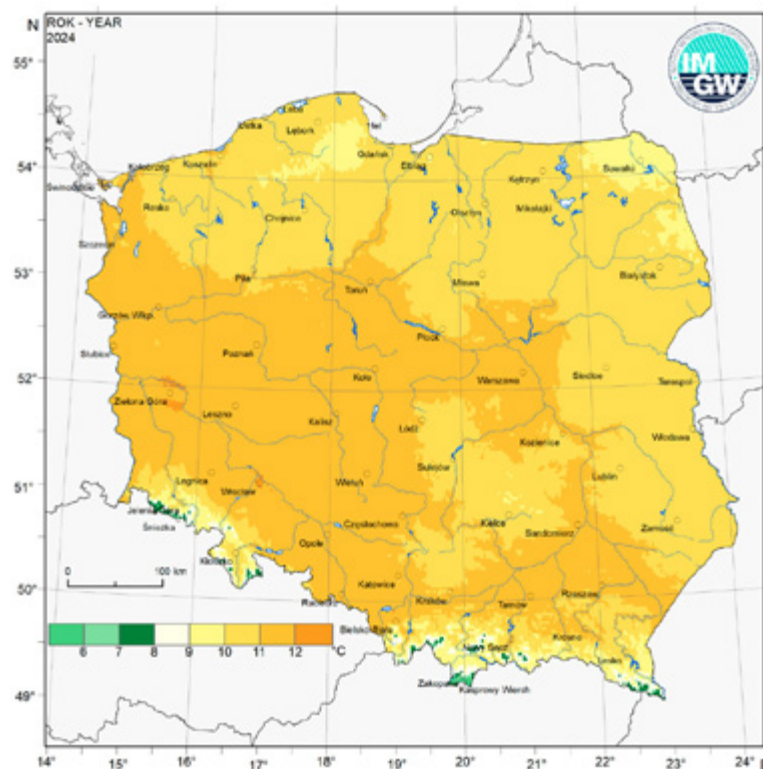
5.1.

Changes in climatic conditions and extreme events in Poland

Europe is warming at approximately twice the global average rate and Poland is no exception. The Institute of Meteorology and Water Management (IMGW-PIB) reports that the national annual mean temperature has risen by more than 2°C since 1951 and that the decade 2015–2024 comprises the ten warmest years in the instrumental record. The warmest single year was 2024, with an area-averaged annual mean of 10.9°C. 2025 was cooler at 9.5°C, but still 0.8°C above the 1991–2020 normal and warmer than any year recorded before the twenty-first

century. Summer temperatures have risen by approximately 2.3°C since 1951, with the strongest warming in the Carpathians (+2.9°C) and the weakest along the Baltic coast (+2.1°C)¹⁰⁶.

FIGURE 38
Annual mean air temperature in 2024 in Poland



Source: Institute of Meteorology and Water Management – National Research Institute (IMGW-PIB), Climate of Poland 2024, Warsaw 2025. <https://imgw.pl/wp-content/uploads/2025/07/CLIMATE-OF-POLAND-2024.pdf>

¹⁰⁶ Institute of Meteorology and Water Management – National Research Institute (IMGW-PIB), Climate of Poland 2024, Warsaw 2025. <https://imgw.pl/wp-content/uploads/2025/07/CLIMATE-OF-POLAND-2024.pdf>

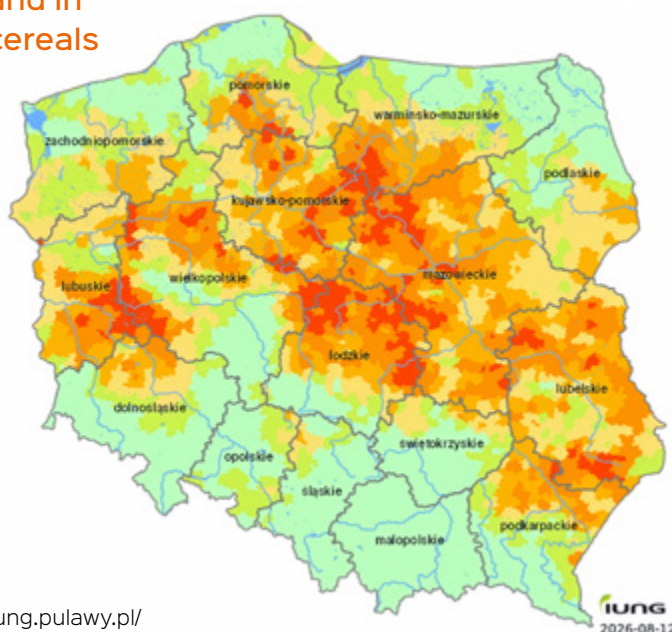
Annual precipitation totals have changed relatively little. The more significant change has been in their distribution. There are fewer days with rainfall, longer dry spells and a larger share of the annual total is now delivered in short, high-intensity events that generate runoff rather than infiltration. Winters have also become markedly less snowy: average snow-cover depth in 1991–2020 was approximately 2.5 cm lower than in 1961–1990, with the largest declines in central Poland, one of the country's principal food-producing regions¹⁰⁷. Almost snowless

winters now occur in clusters. A greater proportion of winter precipitation falls as rain and leaves the field rapidly rather than being retained in the snowpack and released gradually during the thaw. The water-storage function of snow cover is agronomically as important as its insulating function against frost, and its decline is one mechanism by which mild winters contribute to spring drought¹⁰⁸.

Droughts are the dominant climate-related hazards in Poland. They became markedly more frequent from the

1990s onwards and by the 2010s occurred roughly twice as often as in the preceding decades. In fact, agricultural drought is now recorded in most years¹⁰⁹. In both 2025 and 2026 the Agricultural Drought Monitoring System operated by the Institute of Soil Science and Plant Cultivation (IUNG-PIB) confirmed agricultural drought in the first reporting period of the season. In 2025 much of western and central Poland received less than a third of average spring rainfall. Drought conditions eventually extended to around 16% of the country's municipalities and the Vistula at Warsaw fell to its lowest recorded level. Conditions in 2026 followed a similar pattern¹¹⁰.

FIGURE 39
Risk of agricultural
drought in Poland in
2026 – spring cereals



Source: <https://susza.iung.pulawy.pl/>

¹⁰⁷ Wibig J., Jędruszkiewicz J., "Changes in the Intra-Annual Precipitation Regime in Poland from 1966 to 2024", *Atmosphere* 16(7), 2025, 813. <https://doi.org/10.3390/atmos16070813>

¹⁰⁸ Szwed M., Holka M. (2024), 'Climate change from an agricultural perspective', *Agronomy Science* 79(2), 19–34, doi:10.24326/as.2024.5323.

¹⁰⁹ Czapiewska G. (2019), 'Consequences of climate change for farming and rural areas', doi:10.24425/sq.2019.126394.

¹¹⁰ IUNG-PIB, Agricultural Drought Monitoring System, susza.iung.pulawy.pl

Climate change influence on Polish agriculture

Warmer and drier springs and summers have raised forest fire risk. In the first half of 2025 more than 3 300 forest fires were recorded nationally, more than 300 above the equivalent period of 2024¹¹¹. By late May 2026 the figure had reached almost 4 000, roughly 1 500 more than at the same point a year earlier and was described by the Minister of Climate and Environment as a record. Forest litter moisture that spring was comparable to levels normally reached in high summer¹¹². The meteorological conditions governing fire hazard have altered since the 1970s and projections indicate further intensification in both the near and the more distant future¹¹³. Because fire danger is driven by the same heat and moisture deficit that produces agricultural drought, the two hazards tend to peak in the same seasons and in the same regions.

Additionally, climate change has intensified frost risk in Poland. Higher late-winter temperatures advance phenological development, leaving buds and blossom

exposed when cold air returns. Between 20 and 30 April 2026, ground frosts of approximately -10°C were recorded across virtually all fruit-growing regions of Poland, the third consecutive spring in which damaging frost occurred¹¹⁴.

5.2.

Effects of climate change on Polish agriculture

Poland's climate has changed measurably over the past decades and Polish agriculture has already absorbed both the benefits and the costs of that change. Warming has extended the growing season and widened the range of crops that can be grown commercially. At the same time, drought, spring frost and high-intensity rainfall have become more frequent and more damaging in a sector that remains almost entirely rainfed.

The most agronomically significant consequence is the lengthening of the growing season. Before 1960 it ranged from approximately 185 days in the north-east to 220 days or more in the south-west. It now exceeds 240 days in western Poland and reaches 220–230 days across the central lowlands and the Lublin Upland, while the coast and the north-east have changed comparatively little. The extension is con-

¹¹¹ https://oborniki.poznan.lasy.gov.pl/aktualnosci/-/asset_publisher/uOR4JcxbKPbG/content/pozary-w-lasach-podsumowanie-pierwszego-polroczna-2025-roku

¹¹² Polish Press Agency (PAP), statement of the Minister of Climate and Environment, 29 May 2026. <https://www.pap.pl/aktualnosci/minister-klimatu-od-poczatku-roku-w-polskich-lasach-wybuchlo-niemal-4-tys-pozarow-lasow>

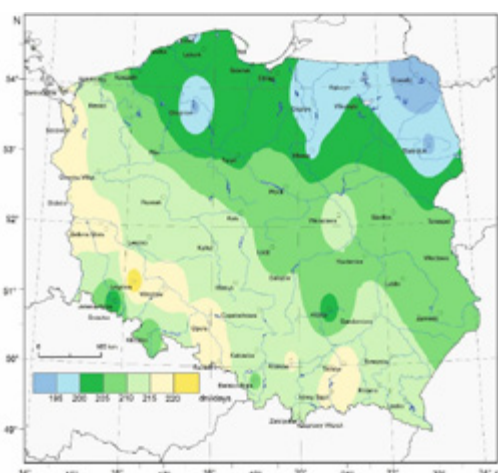
¹¹³ Pińskwar I. et al. (2026), 'Wildfire Hazard in Poland in a Warming Climate: Past and Future Impact of Extreme Weather', *International Journal of Climatology*. <https://doi.org/10.1002/joc.70439>

¹¹⁴ Związek Sadowników RP, evidence to the Sejm agriculture committee, May 2026; see farmer.pl and sadyogrody.pl. Figures are provisional: the municipal damage-assessment commissions had not completed their work as at July 2026.

centrated in the country's principal agricultural regions. Its start has advanced earlier in spring and its end has been slightly delayed, which brings earlier bud break and flowering as well as a longer window for autumn field operations¹¹⁵.

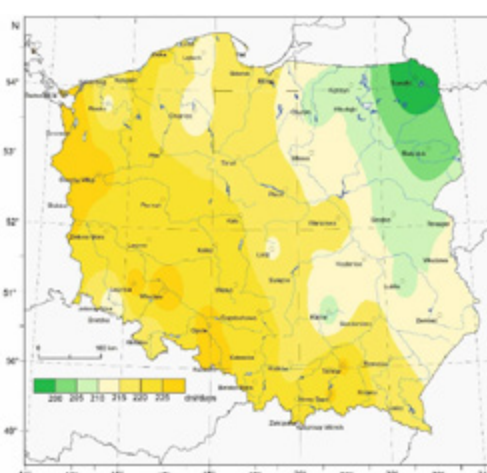


FIGURE 40
Duration of the growing
season in Poland,
1961–1990



Source: Szwed M., Holka M., *Agronomy Science* 79(2), 2024

FIGURE 41
Duration of the growing
season in Poland,
1991–2020



Source: Szwed M., Holka M., *Agronomy Science* 79(2), 2024

In addition, higher temperatures have widened the range of commercially viable crops. The area under grain maize has increased around eightfold since 2000, exceeding 1.3 million ha in 2025 with a harvest of some 10.5 million tonnes. Including silage maize, the crop

occupies close to 2 million ha and Poland is now among the largest producers in the European Union¹¹⁶. Climate change and a longer growing season influence changes in the area used for other crops as well. Higher temperatures and a longer vegetative season creates new oppor-

tunities, specifically for vegetable and fruit production, as exemplified by the recent growth in the harvest of vegetables grown under cover by over a quarter in the period 2019–2025 alone¹¹⁷. The use of controlled-environment production is gaining popularity not because of land scarcity, but increasingly because of

¹¹⁵ Szwed M., Chmst-Sikorska J., Kępińska-Kasprzak M. (2025), 'The growing season of Poland in the changing climate based on phenological observations', *International Journal of Biometeorology* 69, 3503–3514, doi:10.1007/s00484-025-03037-9.

¹¹⁶ <https://stat.gov.pl/obszary-tematyczne/rolnictwo-lesnictwo/uprawy-rolne-i-ogrodnictwo/wynikowy-szacunek-glownych-ziemioplodow-rolnych-i-ogrodniczych-w-2025-r-5,24.html>

¹¹⁷ Central Statistical Office data from *Produkcja upraw rolnych i ogrodniczych* in years 2019 to 2025.

Climate change influence on Polish agriculture

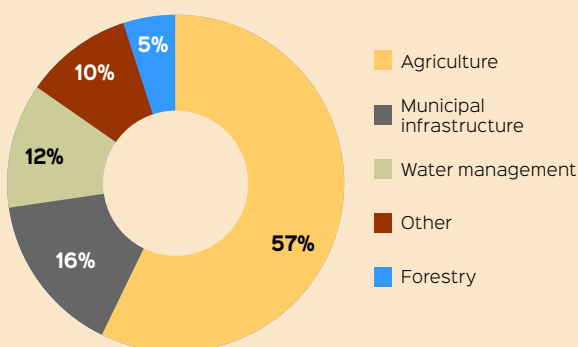
climate risk and the need to stabilize high-value production in the context of warmer climatic conditions. Another such example of climate crisis impact on crop selection is producers moving towards autumn sowing in order to establish crops before the summer water deficit¹¹⁸. It is necessary to underline that opportunities presented by changing weather conditions will not be grasped if we don't prepare the agricultural sector for increased climate exposure and risk, by improving its resilience.

Climate change also has substantial negative effects on Polish agriculture. The sector's losses from extreme climatic phenomena were the greatest among all branches of the economy and equalled 57% of all losses in 2001-2019 period.

The largest of these is the agricultural cost of drought which accounted for 77% of all agricultural losses from extreme phenomena. The sequence of severe droughts between 2018 and 2020 affected more than 332 000 farms and produced con-

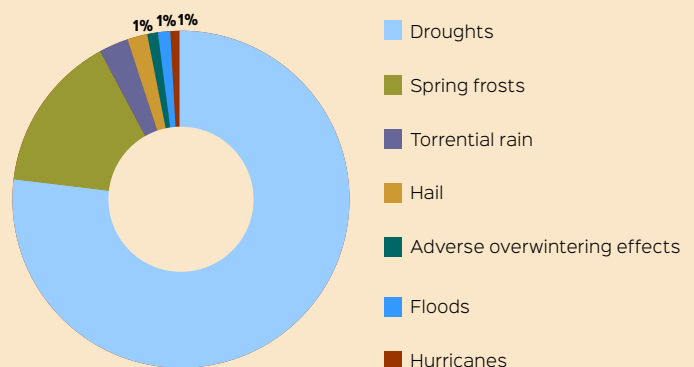
sequences well beyond the sector, with total GDP losses estimated at 0.5–1.0% over the period and agricultural losses of PLN 2–3 billion (approximately EUR 0.5–0.7 billion) per year¹¹⁹. Such years can no longer be regarded as exceptional. The Agricultural Drought Monitoring System operated by IUNG-PIB, which declares drought where modelled yield losses reach at least 20% relative to the long-term average, now issues such declarations across substantial parts of the country in most seasons¹²⁰.

FIGURE 42
Share of losses from individual extreme phenomena by sector in 2001–2019 period



Source: Institute of Environmental Protection – National Research Institute (IÖS-PIB), 2023: Atlas skutków zjawisk ekstremalnych

FIGURE 43
Percentage of total losses in agriculture in Poland resulting from extreme events in 2017–2019



Source: Institute of Environmental Protection – National Research Institute (IÖS-PIB), 2023: Atlas skutków zjawisk ekstremalnych

¹¹⁸ GUS (2025), as above; sown areas by species in GUS, Produkcja upraw rolnych i ogrodnich w 2025 roku

¹¹⁹ World Bank Group, Country Climate and Development Report: Poland (November 2024)

¹²⁰ IUNG-PIB Puławy, Agricultural Drought Monitoring System (System Monitoringu Suszy Rolniczej), <https://susza.iung.pulawy.pl/>

Poland's exposure to drought is amplified by structural factors largely unrelated to meteorological conditions. Approximately 98% of the agricultural area is rainfed and irrigated land accounts for less than 2% of agricultural area, against an EU average of approximately 9%. Renewable freshwater resources stand below 1 700 m³ per inhabitant per annum, which is the United Nations threshold for water stress¹²¹. Some 6.5 million hectares (approximately 35% of agricultural land) are covered by drainage systems, the majority of

which require modernisation and were designed to address excess water, a problem that is now frequently the inverse of the one encountered in practice¹²².

Additionally, climate change has intensified the risk of frost in Poland. An exceptionally warm late March and early April of 2024 advanced crop development by roughly three weeks relative to the long-term norm, after which ground temperatures fell locally to around -8°C during flowering. The resulting harvest of fruit from trees was

recorded at approximately 17% below the 2023 level (at some 3.6 million tonnes) and that of fruit from bushes and berry plantations at more than 11% below (at 501 000 tonnes). Basic cereals declined by about 4% and rape-seed by about 9%¹²³. Frost itself remains a normal feature of the Polish growing season, which records on average about 28 days of ground frost and 13 days of air frost. What has changed is less the frost itself than the stage of crop development at which it occurs¹²⁴.



¹²¹ Eurostat, Water statistics, Statistics Explained. https://ec.europa.eu/eurostat/statistics-explained/index.php?title=Water_statistics

¹²² World Bank Group, Country Climate and Development Report: Poland, November 2024, Chapter 3 and Annex 3. <https://documents1.worldbank.org/curated/en/099110424141522535/pdf/P500551-84768ddb-fe45-43ef-bc50-27100af1c086.pdf>

¹²³ Statistics Poland (GUS), Preliminary estimate of the main agricultural and horticultural crops in 2024. <https://stat.gov.pl/en/topics/agriculture-forestry/agricultural-and-horticultural-crops/preliminary-estimate-of-the-main-agricultural-and-horticultural-crops-in-2024,8,1.html>

¹²⁴ Kalbarczyk R., Kalbarczyk E., "Potential Risk of Frost in the Growing Season in Poland", Agriculture 14(3), 2024, 501. <https://doi.org/10.3390/agriculture14030501>

Climate change influence on Polish agriculture

5.3.

Projected impacts

Climate projections for Poland to 2100 are consistent in direction under both a moderate (RCP4.5) and a high-emission (RCP8.5) pathway. Warming continues, with the largest changes in the winter and summer months. Under the high-emission pathway the annual mean rises steeply after 2050, exceeding 3°C above the level of the current decade.

The growing season lengthens by approximately 20 days under the moderate scenario and by more than 60 days under the high-emission scenario. Hot days and tropical nights become more frequent and frost days less so, while the number of days with precipitation above 20 mm increases under both scenarios¹²⁵.



¹²⁵ IOŚ-PIB, Klimada 2.0, 'Zmiany temperatury i opadu na obszarze Polski w warunkach przyszłego klimatu do roku 2100', klimada2.ios.gov.pl; projekcje.ios.gov.pl.

The agricultural consequences follow from this combination of higher temperatures, a longer season and a less reliable water supply:

Water demand:

Agricultural water requirements are expected to increase by 25–30% by 2050¹²⁶

Crop production:

Under a dry and hot scenario, rainfed crop production is projected to decline by approximately 12% by 2041–2050, with potatoes among the most sensitive crops at up to –30%. Wheat, the most valuable rainfed crop by production value, could decline by approximately 15% in the Lublin region and by 10% in the central voivodeships. Under a wetter and warmer pathway, the same models project gains of approximately 5.4%. Irrigated crops face negative impacts under all scenarios, concentrated in Greater Poland, Lower Silesia and Opole, which indicates that investment in irrigation is robust across the full range of possible futures¹²⁷.

Livestock:

Productivity declines under all warming trajectories. Sheep and goat meat are the most exposed, at approximately –14% by 2041–2050 under dry and hot conditions, with substantial impacts on cattle meat. The introduction of supplemental feed more than halves the modelled losses without eliminating them¹²⁸.

Spring frost:

A reduction in the number of frost days coincides with earlier bud break, so the exposure of orchards and early-flowering crops is likely to persist. The springs of 2024, 2025 and 2026 illustrate the point¹²⁹.

However, it is important to bear in mind that precipitation remains the least certain element in these projections. The gap between the dry-and-hot and wet-and-warm scenarios ranges from a 12% contraction to a 5% expansion in rainfed production, which means that adaptation policy must remain robust across a wide range of outcomes. Moreover, the assumption of a continued extension of the growing season is not certain, as some analyses suggest that this trend has flattened over the past decade in response to rising evapotranspiration demand¹³⁰.

¹²⁶ World Bank Group, Country Climate and Development Report: Poland, November 2024, Chapter 3 and Annex 3. <https://documents1.worldbank.org/curated/en/099110424141522535/pdf/P500551-84768ddb-fe45-43ef-bc50-27100af1c086.pdf>

¹²⁷ World Bank Group, Country Climate and Development Report: Poland, November 2024, Chapter 3 and Annex 3. <https://documents1.worldbank.org/curated/en/099110424141522535/pdf/P500551-84768ddb-fe45-43ef-bc50-27100af1c086.pdf>

¹²⁸ World Bank Group, Country Climate and Development Report: Poland, November 2024, Chapter 3 and Annex 3. <https://documents1.worldbank.org/curated/en/099110424141522535/pdf/P500551-84768ddb-fe45-43ef-bc50-27100af1c086.pdf>

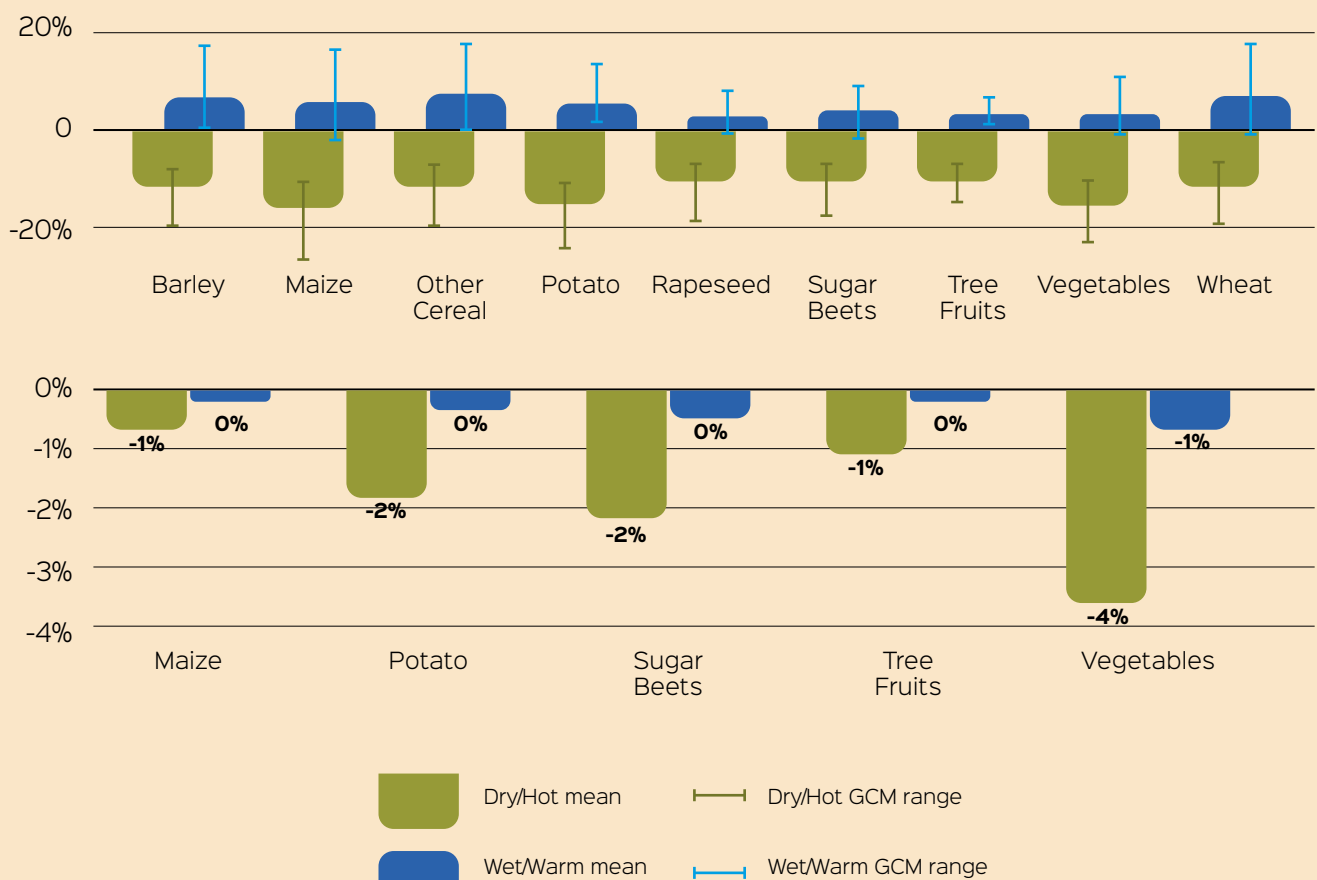
¹²⁹ Szwed M., Chmista-Sikorska J., Kępińska-Kasprzak M. (2025), 'The growing season of Poland in the changing climate based on phenological observations', *International Journal of Biometeorology* 69, 3503–3514, doi:10.1007/s00484-025-03037-9

¹³⁰ Szwed, Chmista-Sikorska and Kępińska-Kasprzak (2025), as above, citing Rahmati et al. (2023) on the possible flattening of the trend.

Climate change influence on Polish agriculture

The economic case for adaptation is favourable. In the absence of adaptation measures, climate impacts on infrastructure, agriculture and labour productivity are estimated to cost Poland approximately 1.2% of GDP by 2050. Resilience investment equivalent to some 0.1% of GDP annually over 25 years would offset almost all of that cost. For agriculture specifically, a package combining irrigation enhancement with climate-smart practices is costed at approximately USD 1.7 billion to 2050 and is projected to eliminate the negative production impacts by 2040–2050, with measurable benefits from the 2030s¹³¹.

FIGURE 44
Projected production
shocks to rainfed (above)
and irrigated crops
(below), by crop type,
2041-2050



Source: World Bank Group (2024), Country Climate and Development Report: Poland.

131 World Bank Group, Country Climate and Development Report: Poland, November 2024, Chapter 3 and Annex 3. <https://documents1.worldbank.org/curated/en/099110424141522535/pdf/P500551-84768ddb-fe45-43ef-bc50-27100af1c086.pdf>

FIGURE 45
Projected impacts on
agricultural production in
Poland (annual average
2041-2050)

Impact channel	Impacted variable	Baseline		Adaptation		Cost (US\$, millions)
		Wet/warm mean	Dry/hot mean	Wet/warm mean	Dry/hot mean	
Labor heat stress	Labor productivity	-0.10%	-0.25%	-0.06%	-0.17%	121.2
Rainfed crops	Crop revenues	5.4%	-12.1%	14.8%	-0.2%	110.3
Irrigated crops	Crop revenues	-0.5%	-2.7%		-0.2%	
Soil erosion	Crop revenues	-0.02%	0.02%	0.0%	0.0%	Cost neutral
Livestock	Livestock revenues	-0.4%	-1.3%	0.0%	-0.4%	58.1

Source: World Bank Group (2024), Country Climate and Development Report: Poland







6

Future of agriculture in Poland and in Europe

Future of agriculture in Poland and in Europe

6.1.

The need for systemic, cooperative agricultural transformation and its benefits

Farmers play a fundamental role in safeguarding European and Polish food security and supplying citizens with safe, high-quality food as well as inputs for other economic branches. At the same time, the agri-food sector and rural communities are facing a growing range of challenges. The sector currently faces the combined pressures of climate change, geopolitical instability, and repeated global crises, while simultaneously being expected to guarantee food security, provide viable livelihoods for those working throughout the food chain, and reduce its environmental footprint.

Taking into account the poly-crisis' effect on agriculture, increasing resilience seems essential, especially in countries that still have done little in this respect, such as Poland. Ensuring the long-term viability of agriculture requires strengthening farmers' climate resilience along with the market practices, food supply chain, regulations and agricultural subsidies that could facilitate this cause. This includes supporting diversified crops and farm animals selection, sustainable land management, ecosystem services, ensuring farmers receive fair remuneration for their products and services to guaran-

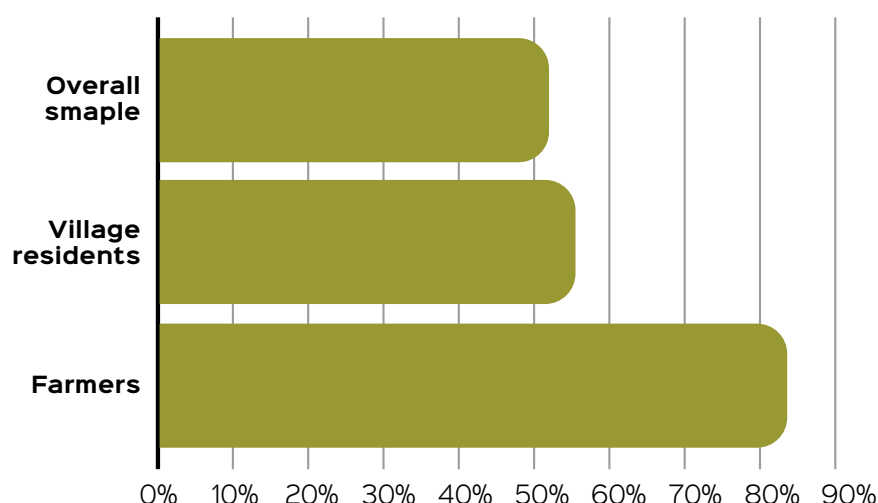
tee sustainable activities are economically viable etc.

Innovation is expected to play a pivotal role in facilitating this transition. Technological advances, including digital agriculture, precision farming, data analytics, and artificial intelligence, offer opportunities to improve resource efficiency while reducing production costs and environmental impacts. At the same time, the transition towards sustainable agriculture requires significant investment in human capital. Farmers and agricultural workers will increasingly need digital competencies, environmental management expertise, and entrepreneurial skills to successfully adopt emerging technologies and respond to evolving regulatory and market demands. One of the major policy challenges will be balancing investments focused on resilience with the need to maintain adequate farm incomes. These may increase production costs in the short term, particularly where suitable technologies and their markets are not yet fully developed. By reducing reliance on costly inputs and making better use of available resources, these approaches can decrease risks, limit inputs as well as costs, and possibly result in greater revenues for farms.

The switch to climate resilient agriculture should be first and foremost presented as an opportunity, not an obligation. This fact is corroborated by the recent agri-food sector backlash against sustainable requirements stemming from EU regulations that took place in Poland and in other European countries¹³².

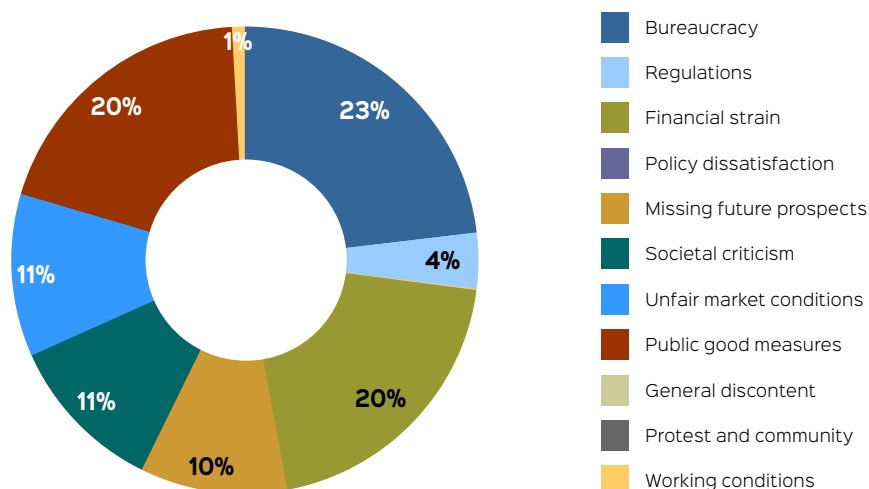
The “polluter pays” principle that is at the forefront of such policies is more challenging in the agri-food sector than in other branches of the economy, such as the energy sector. This is because agricultural outcomes are closely linked to biological processes rather than purely technological ones. Consequently, policy solutions contribute to understandable concerns among conventional farming communities. It is therefore necessary to present climate adaptation actions as advantage that lower production costs, improve farm profitability, and create new economic opportunities for farmers.

FIGURE 46
Survey results on negative connotations of the European Green Deal among Poles.



Source: Own elaboration based on Centrum Badania Opinii Społecznej (2024): Europejski Zielony Ład – z czym kojarzy się Polakom? CBOS Flash (site: https://www.cbos.pl/PL/publikacje/flashy/pliki/2024/fl_023_2024.pdf)

FIGURE 47
Survey results on causes for EU farmers protests in 2024



Source: Läßle, D., Thoyer, S., Van den Broeck, G., Lécole, P., de Mey, Y., & Sok, J. (2026). Farmers' Voices in European Protests: Diverse Complaints, Emotional Tones, and Policy Responses. Food Policy, 138, Article 102999. <https://doi.org/10.1016/j.foodpol.2025.102999>

¹³² E.g. thousands of farmers protested in February 2024 against European Green Deal implementation (see: <https://tvn24.pl/polska/protesty-rolnikow-dlacze-go-rolnicy-protestuja-i-czym-jest-zielony-lad-st7793797>)

Future of agriculture in Poland and in Europe

Achieving the transition towards resilient agriculture will depend heavily on technology. Beyond technological advances, the transformation of Polish food systems requires changes in business models, food processing, retail structures, supply chains as well as consumer behaviour. Farmers are expected not only to adapt to these developments but also to actively shape them. Innovation within agriculture should therefore be understood as a combination of technological, social, and institutional change. Examples include nutrient-enriched food products developed through improved breeding techniques and advanced farming practices, biological pest control supported by farmer cooperation and regulatory frameworks, and machinery-sharing systems that combine digital technologies with collaborative ownership models. These examples demonstrate that improving agri-food resilience depends not only on technological progress but also on appropriate institutional support and social acceptance.

Rather than treating agriculture as an isolated sector, transforming the sector

towards greater resilience should consider the interactions between agricultural production, food processing, distribution, consumption, public health, and environmental protection. Therefore such actions should extend beyond primary production and propose coordinated actions involving all actors across the food value chain. Ultimately, achieving the sustainability transition requires viewing agriculture as one interconnected component of a broader food system. Changes in farming practices influence food processing, distribution, and consumer behaviour, while shifts in dietary preferences and market demand reshape agricultural production. Because these objectives often involve trade-offs, integrated policy frameworks and coordinated innovation strategies will be essential for identifying balanced solutions. Taking into account the experiences, systemic approach and technologies used in different countries could greatly facilitate this process.

This also concerns working together for greater European agricultural resilience. This in turn demands bold, coordinated, and long-term

action across policy, funding, and the entire value chain. Joint voices on the need to implement systemic solutions that facilitate climate crisis adaptation are necessary to achieve pan-European adoption. During Polish presidency in the Council of the EU, a panel of experts identified key measures to achieve these goals¹³³:

- » EU's Common Agricultural Policy funding should be used to facilitate climate adaptation and transformation capacities in farming, ensuring long-term productivity.
- » To unlock investment across the agri-food value chain Common Agricultural Policy should be connected with other EU instruments to finance transformation efforts not just on farms, but also among processors, distributors, and innovators.
- » Funding application processes should be streamlined and simplified to ensure timeliness and accessibility, with innovation, resilience, and environmental performance having priority for financing.

¹³³ Institute of European Environmental Policy, Green Economy Institute (2025): Resilient Agriculture in Poland and the EU: Navigating Challenges and Opportunities in 2025.

- » Developing a long-term strategic framework for a sustainable, resilient, and competitive agri-food sector with a 2040 and 2050 horizon to be used for guiding investment decisions, and provide farmers and businesses with predictable transition path.

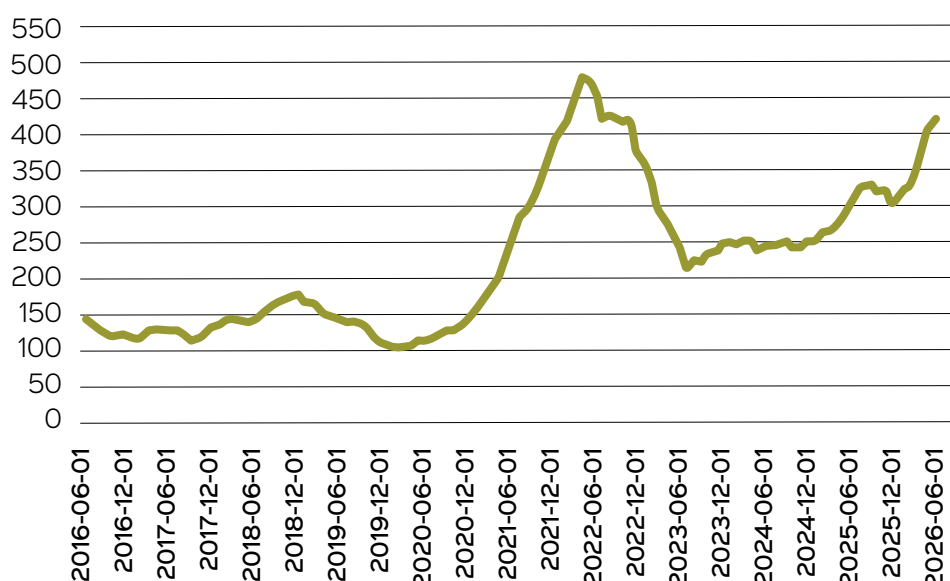
The above suggestions are practical regulatory measures aimed at greater agricultural resilience in the face of the climate crisis. Implementing them into European policy will be an important measure that should facilitate resilience in short as well as long term. Therefore, working together with other countries interested in the same goal, such as the Netherlands, should be considerably intensified.

The future ability of the European agri-food sector to combine productivity, resilience, and environmental sustainability will also depend on ongoing structural changes within agriculture. The number of agricultural holdings has declined steadily, while average farm size—both economically and physically—has increased. Between 2005 and 2020, approximately 5.1 million farms disappeared across the European Union, representing a reduction of around 36%, whereas the total agricultural area declined by only 6.3%. This restructuring has primarily affected farms smaller than five hectares, while the number of holdings exceeding 100 hectares has increased. At the same time, agricultural employment has continued

to decrease, whereas average income per full-time agricultural worker has risen. Today, fewer than 10% of farms manage more than half of the EU's agricultural land, making these larger holdings particularly influential in determining the sector's overall environmental performance.

Alongside structural transformation, European agriculture is facing unprecedented external pressures. Climate change, biodiversity degradation, and geopolitical instability increasingly threaten the stability of food production systems. Extreme weather events are becoming more frequent and severe, while disruptions to global supply chains have exposed vulnerabilities throughout the agri-food

FIGURE 48
Producer Price Index for
fertilizer material in USD



Source: Own elaborations based on U.S. Bureau of Labor Statistics via FRED® (site: <https://fred.stlouisfed.org/series/WPS0652>)

Future of agriculture in Poland and in Europe

sector. These challenges are expected not only to persist but also to intensify, requiring agricultural systems that are capable of coping with highly uncertain future conditions. This is showcased by the recent rise in fertiliser prices, which almost quadrupled from November 2020 until April 2022.

Given the cumulative effects of climate change, market volatility, and geopolitical crises, a narrow interpretation of resilience is unlikely to ensure Europe's and Poland's long-term food security. Instead, future action should work towards resilience as a multi-dimensional concept encompassing robustness, adaptability, and transformation potential¹³⁴. In this context robustness indicates structural and functional stability of the sector despite changing conditions, adaptability – ability to fit into those conditions through changes in the structure of the sector and transformation potential – long term capability to modify the sector's operations, outcomes and characteristics.

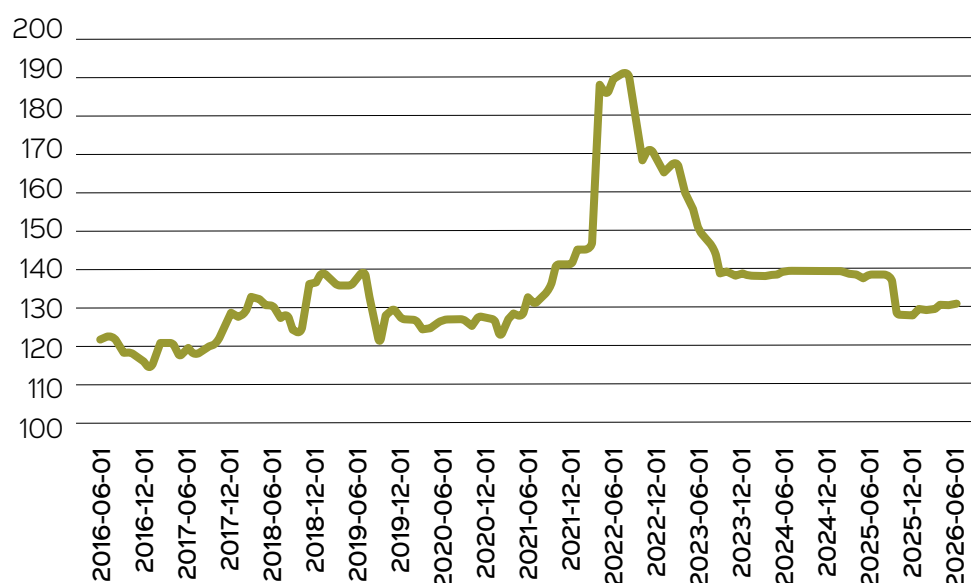
6.2. Robustness

The main aspect of robustness is self- or regional- sufficiency and the use of local resources. In other words being independent from global value chains. This specifically concerns synthetic fertilizers, pesticides and fossil fuels use, as well as being dependent on seeding material from exclusive sources.

Nitrogen balances have gradually declined across the European Union owing to more efficient fertilizer application techniques, improved manure management, higher nitrogen use efficiency, and increased nutrient uptake by crops. Overall use of both mineral and organic fertilizers, including manure, has also fallen, partly as a consequence of declining livestock numbers and the resulting reduction in manure production. Nevertheless, the use of fertilizers still impacts farmers' overall resilience. The same could be said about pesticide use. Between 2011 and 2020, annual pesticide sales across the EU remained relatively stable at approximately 360 million kilograms; nevertheless, their use gravely impacts agricultural self-sufficiency and robustness.

¹³⁴ Nisioti E, Clark C, Das KK, Ernst E, Friedenberg NA, Gates E, Lambros M, Lazurko A, Puzović N and Salas I (2023) Resilience—Towards an interdisciplinary definition using information theory. *Front. Complex Syst.* 1:1236406. doi: 10.3389/fcpxs.2023.1236406

FIGURE 49
Agricultural and Commercial Pesticides and Chemicals prices in USD



Source: Own elaborations based on U.S. Bureau of Labor Statistics via FRED® (site: <https://fred.stlouisfed.org/series/PCU3253203253201>)

Overall, these findings indicate that although European agriculture has improved its resource efficiency and reduced the environmental intensity of production in several areas, these achievements have not been sufficient to substantially increase the sector's overall self-sufficiency that is the prerequisite of robustness in times of climatic, political or economic shocks. Consequently, decreasing the reliance on global value chains of European agriculture remains one of the key challenges for future agricultural policy.



Future of agriculture in Poland and in Europe

6.3.

Adaptability

FIGURE 50
Set of available
adaptation measures
to climate change in
agriculture

Rising temperatures, more frequent extreme weather events, prolonged droughts, and increasing water scarcity are adversely affecting agricultural productivity and soil health, requiring farmers to introduce new adaptation strategies. In addition to preventive measures, effective

response mechanisms are needed to reduce the socio-economic impacts. There are numerous adaptation paths that could be taken. However, it is clear that those paths should be a combination of a number of technologies and policies developed into a coherent system.

Area of Action	Adaptation Instruments
Crop management	» Change of sowing/planting and harvesting dates » Selection of more suitable plant varieties » Adjustments in the crop structure » Regionalization of crops » Agroforestry, forestry and pasture systems, etc. » Limiting the expansion of invasive species
Fertilization	» Changing practices » Precision farming » Use of organic fertilizers » Use of long-acting fertilizers » Growing importance of legumes
Water Management	» Use of irrigation » Precise irrigation » Variable hydration time » Counteracting soil salinity » Rainwater retention » Layered cultivation schemes » Information systems on the relationship between water, fertilization, weather
Use of soils and arable land	» Changing the cropping system » Erosion inhibition » Use of deep-rooted plants » Preventing soil compaction » Organic fertilization, sowing of cover crops, catch crops, sowing and mixtures and biochar » Selection of plants that absorb carbon dioxide

Animal production	» Animal Stocking Control » Use of feed additives » Feed management and reserves » Improving sanitation and veterinary care » Management of herd turnover
Permanent grassland	» Selection of more suitable species and varieties of grasses » Rationalization of grazing » Erosion control » Restoring degraded land » Fertilizing and using deep-rooted plants
Diversification	» Production and sowing structures as well as agricultural and non-agricultural revenues and incomes
Fires	» Implementation of appropriate procedures » Use of a combination of landscape elements to inhibit the spread of fires » Working on contingency plans
Risk management	» Combination of different management tools » Forecasting changes in the situation in the environment » Cooperation and integration
Post harvest	» Reduction of losses » Reuse of unused food and raw materials » Rationalization of inventory and sales channels
Information processes and knowledge transfer	» Improving education » Improving the functioning of agricultural counselling and science » Implementing digital farming practices
Public policies	» Support for climate change resilience technologies » Development of good governance » Infrastructural changes » Initiating and implementing policies promoting the diversification of international agri-food trade

Source: Kulawik, J. (2026). Adaptacja i mitygacja w zarządzaniu ryzykiem klimatycznym w rolnictwie. Ubezpieczenia W Rolnictwie – Materiały I Studia, 1(85). Pobrano z <https://ojs.academicon.pl/ur/article/view/10424>

Future of agriculture in Poland and in Europe

Taken together complementary policy, management, and infrastructure measures are essential for increasing climate resilience, and ensuring the long-term sustainability of European agricultural systems under changing climatic conditions. This has to take into account farm characteristics such as intensity, size, and land use. These factors influence farm management and adaptation practices. Given that various farm types adapt differently, a greater diversity of farm types can mitigate the impacts of climate variability at the regional level. Nevertheless, certain farm types may still remain vulnerable.

What is often neglected is timely climate information and knowledge-building. It enables farmers to make informed decisions about planting, harvesting, and protecting their assets. The benefits extend beyond disaster preparation, as farmers sometimes choose not to adopt adaptation measures due to information gaps, financial constraints, or misaligned incentives. Combining scientific knowledge with local experience helps bridge this gap.

Adaptation is not new to the sector. Farmers are already implementing a mix of efficiency improvements, substitution strategies and more structural redesigns of farming systems. While most efforts currently focus on short-term adjustment, there is growing momentum towards deeper, long-term transformation of farming models.



6.4.

Transformation potential

Currently predicted megatrends can significantly change the structure and operations of the agricultural sector in Poland, Europe and beyond. Preparing for them is crucial to attain long-term resilience.

Continued global population growth is driving an increasing demand for food production while simultaneously intensifying the need for land to support the transition to low-carbon energy systems¹³⁵. As a result, competition for land resources is becoming increasingly pronounced, particularly in densely populated regions where available space is limited. However, this challenge may provide a long term opportunity for agricultural transformation. Integrating photovoltaic technologies, wind turbines and biogas plants into existing agricultural landscapes represents an increasingly important strategy for agricultural resilience through diversification and enhancement of farmers' energy self-sufficiency.

By 2050 the transformation of food systems towards healthy diets, improved productivity and halving of

food waste could result in a fundamental restructuring of global agriculture¹³⁶. This could result in a 6% median decrease in agricultural land compared with 2020 and 17% lower agricultural production. Within this, the value of live-stock production would be substantially lower than current 2050 projections, while vegetable, fruit, nut and legume production value would increase. Obviously, those results are dependent on the assumed policies to achieve the transformation but they are conditional on farmers' preparedness as well. Building expertise, education and know-how in agricultural production of the future is crucial for its long-term resilience.

Agricultural activities have consistently been identified as one of the principal drivers of biodiversity loss, greenhouse gas emissions and environmental pollution across Europe. Together with urban expansion and forestry, agriculture has substantially reshaped European ecosystems. Key drivers of this process include increasing field sizes and the associated loss of structural landscape diversity, widespread pesticide use, declining diversity of

¹³⁵ Barron-Gafford et al., 2021

¹³⁶ Gibson, M., Sundiang, M., Mason-D'Croz, D. et al. Food systems transformation would reshape global agriculture. *Nature* (2026). <https://doi.org/10.1038/s41586-026-10775-2>

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cultivated crop varieties, intensive fertilizer application, and insufficient ecological connectivity between protected areas¹³⁷. There is no doubt that in the future the agri-food sector will have to modify its processes, structure and production factors employed to decrease its externalities. Considerable results can be achieved through adaptation methods that result in decreased environmental harm compared to standard practices. However, this indirect effect of climate adaptation measures might not be enough to answer the demands of legislators stemming directly from planetary circumstances.



¹³⁷ (Mupepele et al., 2021).





An aerial photograph of a lush green field, possibly a golf course or agricultural land, with a white stylized number 7 overlaid on the right side.

7

**Opportunities
for Dutch
companies
in Poland**

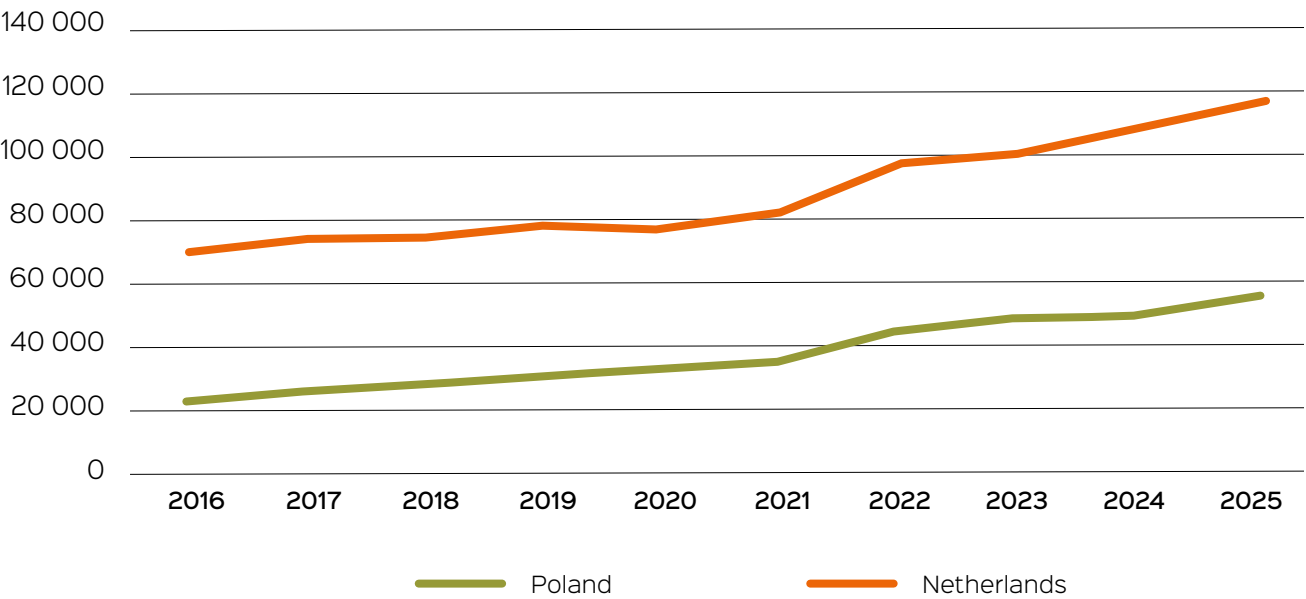
Opportunities for Dutch companies in Poland

7.1.
Current state of
cooperation

Poland’s agri-food trade expanded significantly between 2000 and 2025. Growth accelerated rapidly after Poland’s accession to the EU single market in 2004, which integrated domestic producers into the Common Agricultural Policy and opened tariff-free access to the bloc. Throughout the period Poland maintained a consistent and steadily widening trade surplus, confirming agri-food as a structural

surplus sector for the national economy. Despite considerable growth, as of 2025 Polish agri-food export value equals half the amount recorded by the Netherlands, which is the leader in this aspect among EU countries, with Poland placing 6th. Nevertheless, the gap between the two countries decreases quickly, as the same indicator totalled ca. 1/3 of the Dutch one in 2016.

FIGURE 51
Intra- and extra-EU
exports of food, drinks
and tobacco (EUR million)

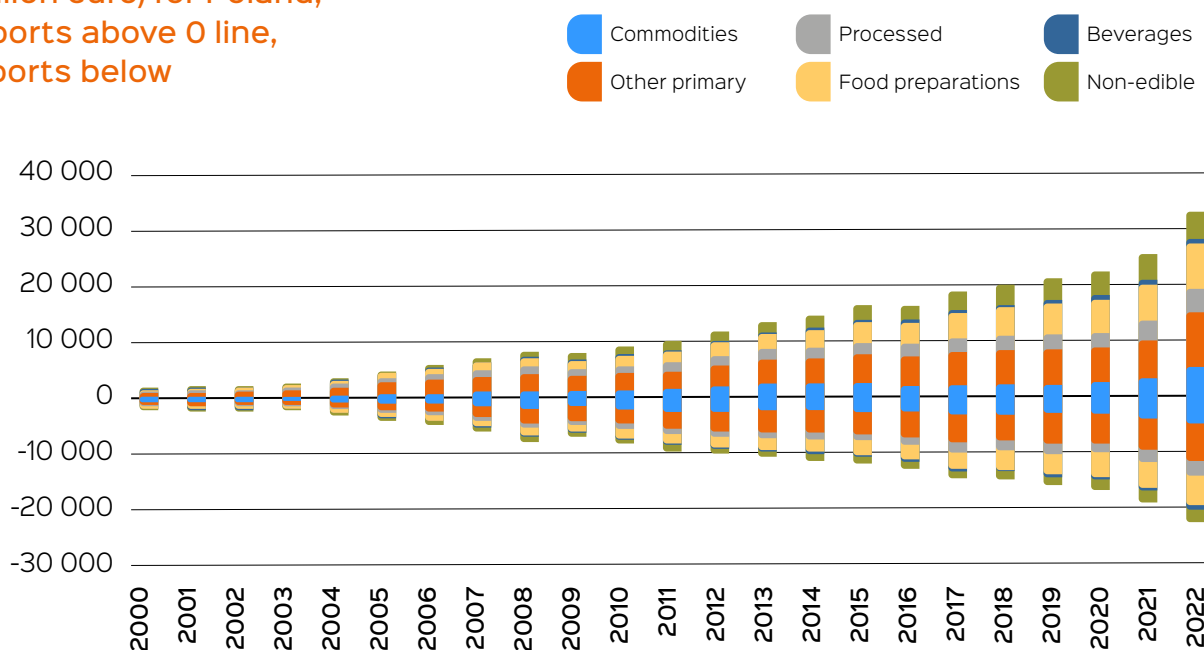


Source: Eurostat database: <https://ec.europa.eu/eurostat/web/international-trade-in-goods/database>

The composition of exports in Poland shifted gradually toward higher value-added goods such as processed products and food preparations, indicating movement up the value chain rather than reliance on raw commodities alone. Nevertheless, agri-food imports continued to constitute a substantial share of total trade, growing in step with exports and remaining particularly significant in categories such as “food preparations” and “other primary” (e.g. meat, dairy).



FIGURE 52
Structure of agri-food trade with EU countries (million euro) for Poland, exports above 0 line, imports below



Source: <https://agridata.ec.europa.eu/extensions/CountryFactsheets/CountryFactsheets.html?memberstate=Poland>

Opportunities for Dutch companies in Poland

Poland is one of the Netherlands' top European trading partners. Both imports and exports have experienced considerable growth in recent years. In fact, exports from the Netherlands to Poland grew faster than imports. Between 2019 and 2021, exports from the Netherlands to Poland and South Korea recorded the highest growth rates among its major trading partners. Export growth to Poland was particularly strong, increasing by nearly 37% during this period¹³⁸. The types of goods imported to the Netherlands from Poland somewhat resemble those exported. The food and live animals category ranks third with 14% of total imports.

The Netherlands is the second largest importer of agricultural products within the EU and continues to be the second largest exporter of agricultural products in the world¹³⁹. The horticulture sector is also an important segment of the economy. The country is a leader in the production of flowers, plants and seeds. The strong position is the result of high intensity of cultivation and breeding. This intensive agricultural production is fuelled

by state-of-the-art technologies. In recent years some of those technologies as well as business models used have been built around the concept of circularity. Some examples include renewable energy sources, low-energy horticultural production, aquaponic systems or platforms matching producers and consumers in local areas.

These and other circular solutions could be used in Poland. This possibility is even more pronounced as the Polish agricultural sector's competitive advantages have resulted mainly from price considerations. However, due to the unification of markets and increased global trade the productivity rise in Polish agriculture seems a necessity. Therefore, any processes that increase productivity, such as: the implementation of new technologies and business models, e.g. digitization, data analysis, farm integration allowing to achieve economies of scale and reducing transactions would be desirable. These changes could be easily adapted to be in line with the concept of circular economy, with the benefit to the environment.

Circular transition is also fa-

cilitated by the political will in the EU, the Netherlands and to a much lesser extent in Poland. It seems that current global processes, specifically increase in global trade, will push changes in the agricultural sector in Poland even without regulators' specific interest. Increasing productivity, also through circular solutions, is essential in this aspect. As excessive consumption of fertilizers, introduction of monocultures and other intensive approaches pose a great threat to the quality of the environment in which people live, the circular economy concept could help to curtail these externalities, without limiting the possible competitiveness growth, or rather supporting it. To do so business environment modification would be helpful. Poland has relatively vast areas of arable land. Most of the farms are small in size and use relatively old methods of production, characterised by 'respect towards resources'. This offers the possibility of using current farms as a blank slate, for applying circular solutions. On the other hand, there are more and more sizable and already efficient farms that explore subsequent options for further enhancing their competitiveness.

¹³⁸ <https://longreads.cbs.nl/dutch-trade-in-facts-and-figures-2022/international-trade-in-goods-composition-and-geography/>

¹³⁹ <https://www.trade.gov/country-commercial-guides/netherlands-agriculture>

7.2.

Irrigation technologies

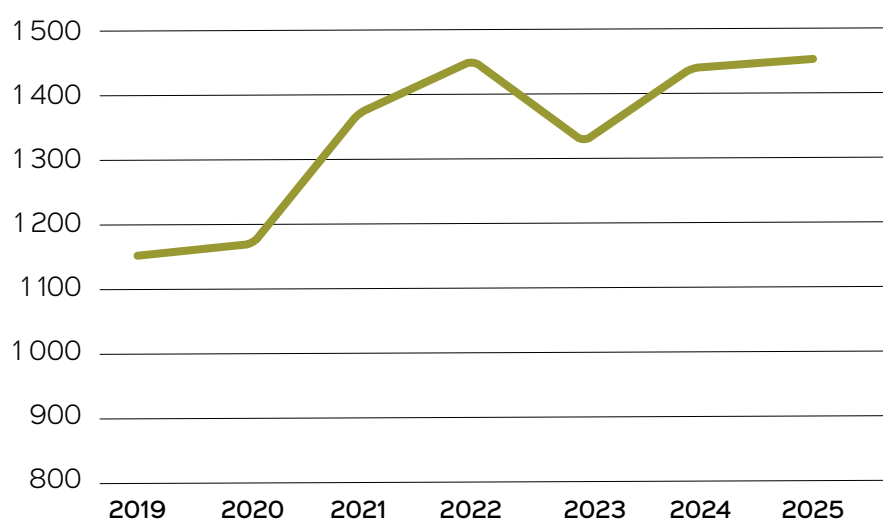
Drought is the single most important cause of production and economic losses in Polish agriculture (see chapter 5), with increasingly frequent periods of water scarcity reducing crop yields, limiting production stability, and increasing financial risks for farmers. In this context, the adoption of Dutch irrigation and water management technologies offers significant opportunities to improve the resilience, productivity, and sustainability of Polish farms.

The Netherlands has developed world-leading expertise in precision irrigation and digital water management, combining real-time sensors, satellite monitoring, and data-driven decision support

systems. By implementing these technologies, Polish farmers could continuously monitor soil moisture and crop water stress, allowing irrigation to be applied only when and where it is needed. This would improve water use efficiency, reduce pumping costs, and protect crops during increasingly frequent drought periods.

Dutch drip and precision irrigation systems deliver water directly to plant roots while integrating sensor data and automated control systems to optimize irrigation timing and dosage. Such technologies are particularly suitable for Poland's fruit, vegetable, and horticultural sectors, where efficient water management directly influences both crop quality and yields. Recirculating irrigation systems further capture, filter, and reuse water and nutrients that are not absorbed by plants, minimizing water losses, fertilizer leaching, and environmental pollution. These technologies could be used in Polish developing greenhouse production which is situated mainly in central Poland (Mazowieckie, Wielkopolskie, Kujawsko-Pomorskie, Łódzkie Voivodeships).

FIGURE 53
Harvests of vegetables grown under cover in Poland in thousand tonnes



Source: Own elaboration on Central Statistical Office data from Produkcja upraw rolnych i ogrodniczych in years 2019 to 2025.

Opportunities for Dutch companies in Poland

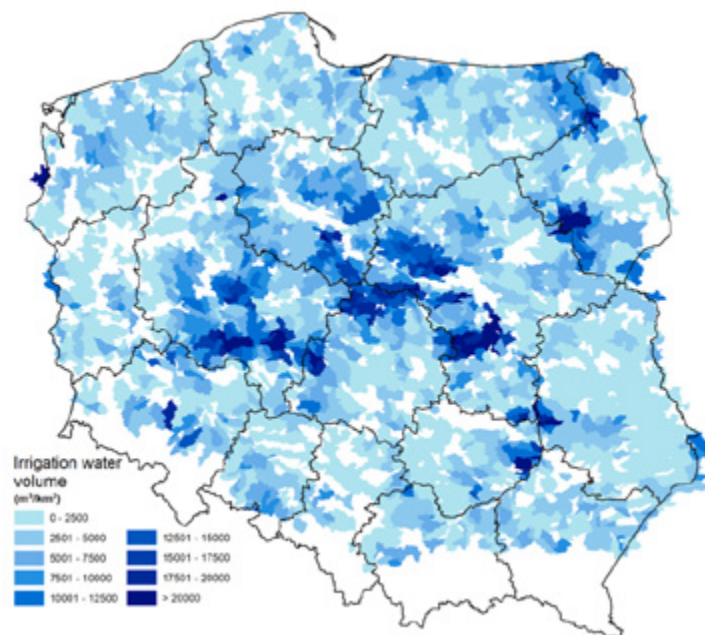
Polish farmers could also benefit from Dutch expertise in water retention and storage. Innovative freshwater storage tanks, closed drainage systems, and integrated water infrastructure allow excess rainfall to be retained for later use during dry periods instead of being discharged. These solutions reduce vulnerability to drought while simultaneously limiting nutrient losses and soil salinization, contributing to more stable agricultural production under increasingly variable climatic conditions.

The demand for such technologies might be the greatest in regions that have the highest irrigation demands. Due to the variation in precipitation, the drought-prone nature of the soils, and the varying concentration of crops suitable for irrigation, Polish regions are quite heterogeneous when irrigation needs are concerned. Highest demands are observed in central Poland, especially the Wielkopolskie, Kujawsko-Pomorskie, Łódzkie and Mazowieckie Voivodeships. The variability is also visible among different crops. On average, vegetables required the least supplemental irrigation, followed by orchards,

while corn exhibited the highest average supplemental irrigation need¹⁴⁰.

The Netherlands has also pioneered advanced water recycling technologies, particularly in greenhouse horticulture, where irrigation water is continuously collected, disinfected, monitored, and reused. Combined with hydroponic cultivation systems, these technologies can reduce freshwater consumption by up to 90–95% while maintaining high productivity and minimizing nutrient emissions. Although primarily developed for greenhouse production, many of the underlying principles of water reuse and nutrient recirculation can also be adapted to intensive horticultural production in Poland.

FIGURE 54
Spatial variation of the annual average abstraction of water for irrigation simulated for the period 1993–2019. White spaces correspond to a low fraction of crops in particular areas (sub-basins)



Source: Marcinkowski, Paweł & Piniewski, Mikołaj & Okruszko, Tomasz, 2024. "Towards sustainable agricultural water management in Poland – How to meet water demand for supplemental irrigation?," *Agricultural Water Management*, Elsevier, vol. 306(C).

¹⁴⁰ Marcinkowski, Paweł & Piniewski, Mikołaj & Okruszko, Tomasz, 2024. "Towards sustainable agricultural water management in Poland – How to meet water demand for supplemental irrigation?," *Agricultural Water Management*, Elsevier, vol. 306(C).

Overall, the transfer of Dutch irrigation technologies would help Polish agriculture adapt to one of its greatest challenges—water scarcity. By combining precision irrigation, digital monitoring, water retention, recycling, and intelligent water management, Polish farmers could reduce the economic impacts of drought, improve water-use efficiency, stabilize yields, and strengthen the long-term resilience and competitiveness of the agricultural sector.

7.3.

Combined renewable energy and agrivoltaics

Polish farmers could significantly benefit from adopting Dutch expertise in combined renewable energy systems and agrivoltaics, enabling farms to reduce energy costs, increase energy independence, and create additional income streams while maintaining agricultural production. As energy prices continue to rise and agriculture becomes increasingly electrified, integrated renewable energy systems can strengthen the economic resilience and long-term competitiveness of Polish farms.



The Netherlands has developed comprehensive farm-scale energy solutions that combine multiple renewable energy technologies with intelligent energy management. Dutch expertise includes integrating solar energy, heat pumps, combined heat and power units, thermal energy storage, aquifer thermal energy storage, and battery systems into microgrids that allow farms to operate largely off-grid. Such systems would enable Polish farmers to reduce dependence on volatile electricity markets, improve energy security, and lower operating costs while supporting the electrification of irrigation, greenhouse production, cold storage, and agricultural machinery.

Opportunities for Dutch companies in Poland

One of the most promising areas for Poland is agrivoltaics, where photovoltaic panels are installed above or alongside crops, allowing simultaneous food and energy production on the same land. Dutch agrivoltaic systems are designed to optimize both agricultural and energy outputs: solar panels provide partial shade that can reduce heat stress and water evaporation, while crops growing beneath the panels help cool the photovoltaic modules, improving their electricity generation efficiency. This dual-use approach enables farmers to diversify their income without removing land from agricultural production.

The benefits of agrivoltaics are also dependent on particular crops selection. Some plants, e.g. blueberries plantations of which in Poland are on the rise¹⁴¹ require shade that photovoltaic panels can provide, along with possible protection from hail. Number of hours in sunny weather suggests that agrivoltaics would have most sense in Wielkopolskie, Mazowieckie, Podkarpackie, Dolnośląskie, Lubelskie Voivodeships. There are still some legal hurdles for their implementation¹⁴², however, efforts are underway to propose legal solutions that classify agrivoltaic systems as agricultural infrastructure, similar to irrigation systems.

Polish farmers could also benefit from Dutch innovations that maximize solar energy production through advanced technologies such as dual-axis solar tracking systems and concentrating solar collectors. These solutions increase renewable energy generation, making on-farm energy systems more productive and economically attractive, particularly for energy-intensive agricultural operations such as milk production and greenhouse.

Dutch experience in integrated energy management is particularly relevant for greenhouse horticulture, where renewable electricity can be combined with

FIGURE 55
Average number of total hours with sun during the whole year in 1991-2020 period



Source: Instytut Meteorologii i Gospodarki Wodnej (2021): Zestaw norm klimatycznych dla Polski

141 See: <https://jagodnik.pl/top-10-gminy-z-najwiekszym-arealem-uprawy-borowki-w-polsce/>

142 Szuta, Agnieszka & Makowski, Kamil & Szczepańska, Agnieszka. (2025). Implementing agrivoltaics in Poland: Policy and impact of photovoltaic farms on rural landscapes. *Landscape Online*. 100. 1132. 10.3097/L.O.2025.1132.

efficient heating, cooling, lighting, and climate control systems. Intelligent energy management platforms coordinate energy generation, storage, and consumption, ensuring that renewable energy is used as efficiently as possible throughout the year while minimizing waste and operating costs.

Overall, transferring Dutch expertise in combined renewable energy systems and agrivoltaics would help Polish farmers reduce energy costs, increase farm self-sufficiency, strengthen resilience to energy market volatility, and diversify farm revenues while supporting the transition towards low-carbon, climate-resilient agriculture. By integrating renewable energy production with agricultural activities, Polish farms could simultaneously improve environmental performance and long-term economic sustainability.

7.4.

Greenhousing and controlled-environment technologies

Polish farmers could substantially benefit from adopting Dutch greenhouse and controlled-environment technologies, particularly in high-value horticultural production. These technologies would enable more efficient use of land, water, energy, and other production inputs while increasing yields, crop quality, and resilience to climate variability. Controlled-environment solutions for Poland are particularly beneficial not because of land scarcity, but increasingly because of climate risk and the need to stabilize high-value production.

Dutch expertise in controlled-environment agriculture allows year-round production through precise regulation of temperature, humidity, CO₂ concentration, and lighting. By implementing advanced climate control systems, Polish growers could create optimal growing conditions regardless of external weather, reducing production risks, extending growing seasons, and ensuring more consistent crop quality.

The adoption of energy-efficient greenhouse technologies would further improve farm profitability. Dutch greenhouses utilize high-performance glazing,



Opportunities for Dutch companies in Poland

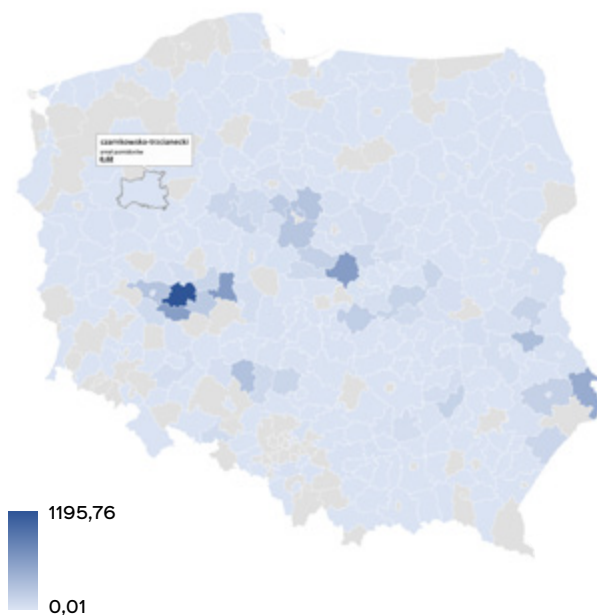
automated shading systems, LED lighting, heat recovery, geothermal energy, and all-electric heating solutions supported by intelligent climate management software. These technologies significantly reduce energy consumption while maintaining optimal conditions for crop growth, helping Polish greenhouse producers lower operating costs and reduce greenhouse gas emissions. The areas with possibly greatest demand for such technologies should coincide with regions of tomatoes

production, as tomato production constituted 58.4% of total production of vegetables under cover in Poland in 2025¹⁴³. It seems that the southern part of Wielkopolskie Voivodeship, Kujawsko-Pomorskie, south Mazovia region as well as eastern Lubelskie Voivodeship are regions with greatest potential for such technologies implementation in Poland.

Polish farmers could also benefit from Dutch expertise in hydroponic and substrate-based cultivation systems. Growing crops without

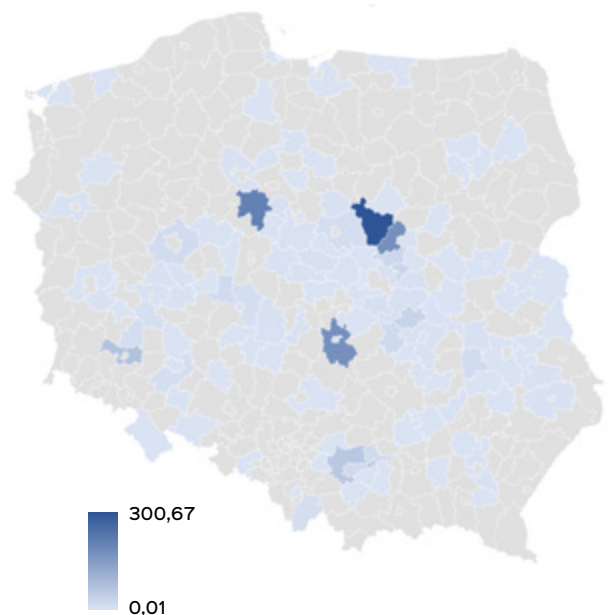
soil reduces the risk of soil-borne diseases, enables higher planting densities, and improves control over nutrient delivery. Combined with recirculating irrigation and fertigation systems, these technologies maximize water and fertilizer efficiency while minimizing nutrient losses and environmental impacts. These technologies are particularly relevant in production of vegetables such as lettuce. Such production takes place in relatively big, specialized farms located in western Mazovia, Kujawsko-Pomorskie and Łódzkie Voivodeship.

FIGURE 56
Area used for tomatoes production as of 2025 by county in ha



Source: Own elaboration based on <https://rejestrupraw.arimr.gov.pl/#>

FIGURE 57
Area used for lettuce production as of 2025 by county in ha



Source: Own elaboration based on <https://rejestrupraw.arimr.gov.pl/#>

¹⁴³ Central Statistical Office data from Produkcja upraw rolnych i ogrodnich w 2025.

For producers seeking to maximize production on limited land, Dutch vertical farming systems offer an opportunity to cultivate vegetables, herbs, flowers, and other high-value crops in multi-layer, fully climate-controlled facilities. Such systems increase production per square metre while reducing dependence on seasonal weather conditions. Nevertheless, the demand for such technologies, due to lack of immediate land scarcity in Poland, would be limited and could be implemented only based on the argument of greater economic efficiency.

Water efficiency represents another major advantage of Dutch greenhouse technologies. Closed-loop greenhouse production continuously collects, disinfects, monitors, and recirculates irrigation water, reducing freshwater consumption by up to 90–95% while limiting nutrient emissions. These systems would help Polish growers address increasing water scarcity and comply with stricter environmental standards.

Overall, adopting Dutch greenhouse and controlled-environment technologies would enable Polish farmers to increase productivity, improve product quality,

reduce energy and water consumption, strengthen resilience to climate change, and enhance the competitiveness of Poland's horticultural sector through highly efficient, technology-driven production systems.



Opportunities for Dutch companies in Poland

7.5.

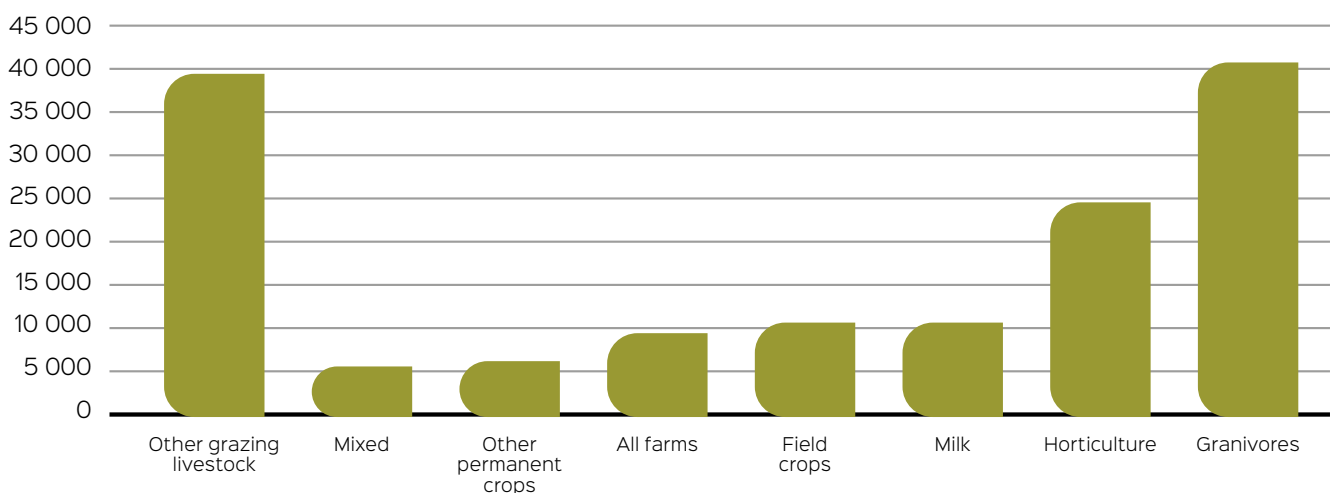
Sustainable dairy and poultry production

Polish poultry and milk production are among the agricultural branches with relatively the highest investment expenditure, as exemplified below by the liabilities per farm. This in turn implies that they are among the sub-sectors that seek development opportunities and are interested in state-of-the-art solutions to increase their competitiveness.

Indeed both poultry and milk subsectors in Poland realized their development potential

at least partially, as their production increased considerably throughout recent years. Poultry producers expanded their level of production over twofold in 2014-2025 period. This is due to demand from the EU where poultry is one of Poland's key export products¹⁴⁴. However the production is often aimed at achieving lowest prices possible without caring for externalities. Recently it seems however that Polish consumers took the path of Western Europeans and are buying more sustainable food products.

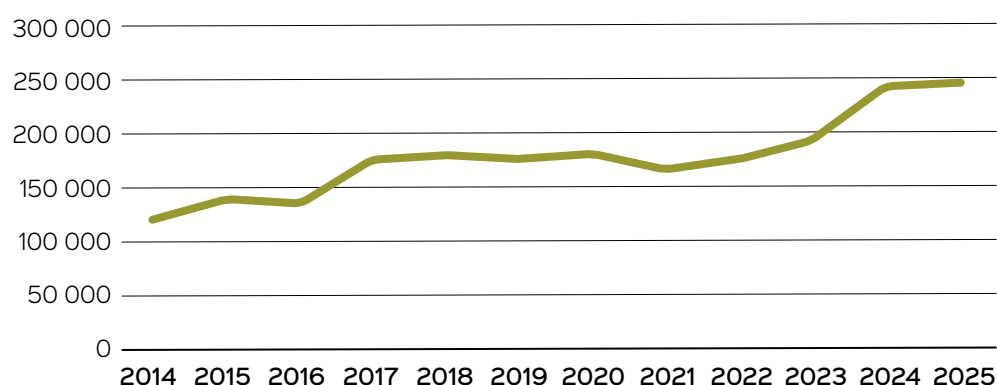
FIGURE 58
Liabilities by type of farming in Poland, EUR per farm, 2017



Source: European Commission (2020): Financial needs in the agriculture and agri-food sectors in Poland.

¹⁴⁴ <https://www.farmer.pl/produkcja-zwierzece/drob-i-jaja/polska-liderem-drobieu-w-ue-a-koszty-rosna-branza-o-regulacjach-ke-i-grypie-ptakow,182875.html>

FIGURE 59
Number of chickens at
the end of the year in
thousands



Source: GUS (2026); Zwierzęta gospodarskie w 2025 r.

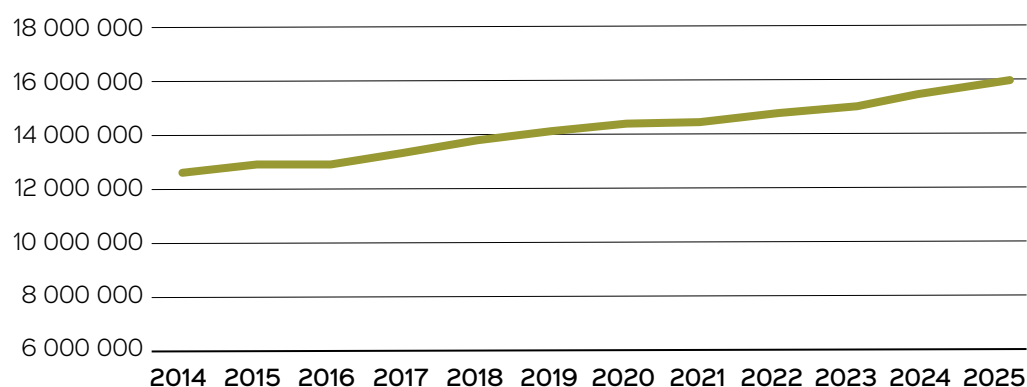
In the face of growing challenges arising from diseases and competition on the international market, it is becoming crucial to improve the quality of poultry meat produced in Poland. The use of modern technologies in production, such as intelligent farming management systems, feed management and monitoring of bird health, can contribute to a significant increase in efficiency and safety. Dutch management technologies could be used

to this extent. This is particularly relevant in the face of recommendations of the European Food Safety Authority on reducing the density of poultry and putting emphasis on limiting the growth rate of animals¹⁴⁵.

Another notable agricultural branch that has the investment potential to implement modern technologies that in turn could improve both its efficiency and sustainability is the milk sub-sector. It is

already one of the most important branches of agriculture in Poland, while it still experiences growth. The production value increased by over a quarter in the last decade.

FIGURE 60
Cow milk production
in thousand litres



Source: GUS (2026); Produkcja mleka krowiego, mleczność krów. Dane roczne 2014-2025

¹⁴⁵ EFSA AHAW Panel (EFSA Panel on Animal Health and Animal Welfare), Nielsen SS, Alvarez J, Bicoût DJ, Calistri P, Canali E, Drewe JA, Garin-Bastuji B, Gonzales Rojas JL, Schmidt CG, Herskin M, Miranda Chueca MA, Padalino B, Pasquali P, Roberts HC, Spooler H, Stahl K, Velarde A, Viltrop A, Winckler C, Tiemann I, de Jong I, Gebhardt-Henrich SG, Keeling L, Riber AB, Ashe S, Candiani D, García Matas R, Hempen M, Mosbach-Schulz O, Rojo Gimeno C, Van der Stede Y, Vitali M, Bailly-Caumette E and Michel V, 2023. Scientific Opinion on the welfare of broilers on farm. EFSA Journal 2023; 21(2):7788, 236 pp. <https://doi.org/10.2903/j.efsa.2023.7788>

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However, the sub-sectors' production typically leaves a considerable environmental footprint, while the economic loops have not been closed, e.g. by-products are not used to a full extent. According to an analysis by the Food and Agriculture Organization of the United Nations (FAO) analysis¹⁴⁶, the dairy sector is responsible for about 4% of global greenhouse gas emissions. Its experts estimate that thanks to innovative solutions – such as optimizing cow nutrition, using biogas plants or precise water management – emissions can be reduced by up to 30%, while maintaining high quality and production efficiency.

Dutch companies could offer to realize this potential in Poland. There is a large need to introduce new technologies, such as milking machines and other types of supporting equipment, to increase the quality of milk and decrease labour costs. The use of renewable energy sources in dairy farms, recycling of production waste and providing appropriate management of living conditions and veterinary care are other important avenues for possible Dutch involvement.

The main regions that should be considered for these types of business activities in milk and poultry sub-sectors are e.g. Warmia and Mazury, Podkarpacie, Lubelskie, Świętokrzyskie and Podlaskie Voivodeship. These under-invested regions could be a blank slate, that could enable ecological agricultural production.

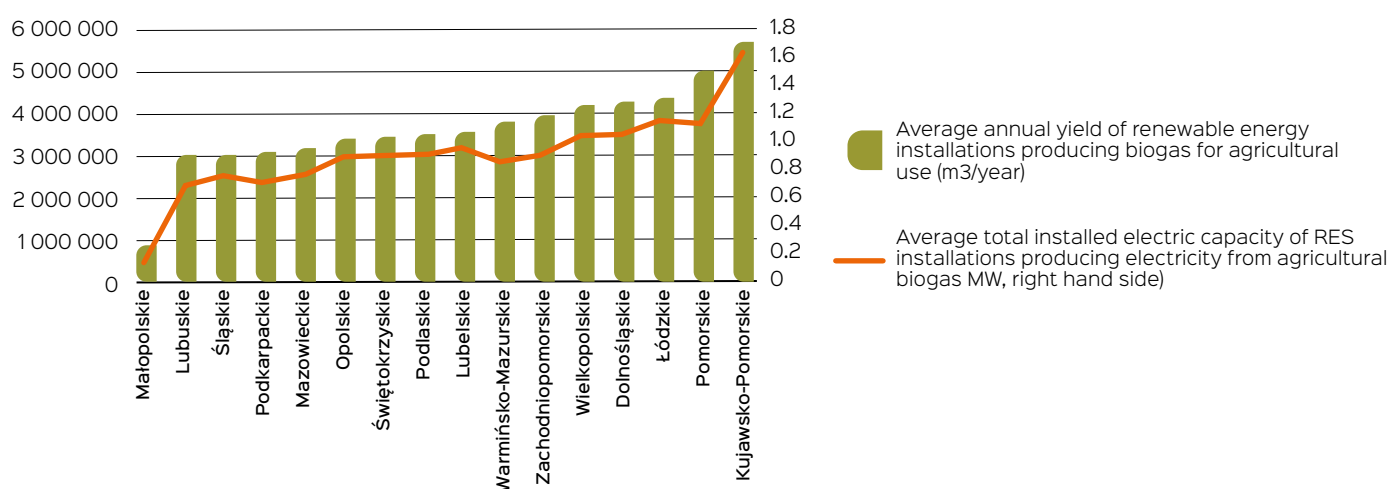


¹⁴⁶ Gerber, P.J., Steinfeld, H., Henderson, B., Mottet, A., Opio, C., Dijkman, J., Falucci, A. & Tempio, G. 2013. Tackling climate change through livestock – A global assessment of emissions and mitigation opportunities. Food and Agriculture Organization of the United Nations (FAO), Rome.

7.6.

Biogas plants and biorefineries and sustainable fertilization

FIGURE 61
Average annual capacity (m³/year) and installed capacity (MW) of RES installations producing agricultural biogas - breakdown by Voivodeship



Source: Blaszkę, Małgorzata. „Regional differentiation of agricultural biogas, biocomponent and biofuel production in Poland.” Environmental Protection and Natural Resources, vol. 35, no. 4, National Research Institute, Institute of Environmental Protection, 2025, pp. 14-28. <https://doi.org/10.2478/oszn-2025-0008>.

Given Poland's substantial agricultural land base and the country's status as a net energy importer, a thriving biogas sector represents a strategically important pathway toward both energy security and circular economy objectives. The raw materials most commonly used for biogas production include maize silage, slurry and manure, with growing interest in expired food products and agri-food processing waste as lower-cost, high-energy substrates.

Rural Poland has significant untapped biomass potential (agricultural residues, forest biomass and organic waste streams) well suited to biogas-based renewable heating and off-grid power, including applications in district heating, local industry,

and agriculture (e.g. greenhouse heating). Liquid biofuels for agricultural machinery represent an additional avenue. The highest potential is concentrated in remote, sparsely populated regions of eastern Poland, where grid access is limited but biomass availability is high.

Currently, agricultural biogas activity is most developed in western, north-western and northern Poland, where specialised livestock operations provide reliable supplies of organic residues. In other parts of the country, dedicated feedstock collection systems would be required. As noted, Poland only began injecting biomethane into the national gas grid in 2025¹⁴⁷ and estimates suggest that current installed biogas capacity represents

Opportunities for Dutch companies in Poland

only a small fraction of the country's realistic potential, leaving substantial room for expansion with appropriate regulatory and investment frameworks.

Sustainable fertilisation practices are currently concentrated on larger, professionally managed farms, predominantly in western Poland. In many other regions, particularly those with smaller and more fragmented farm structures, mineral fertilisers remain dominant and manure management is conducted in ways that generate negative environmental externalities, including nitrate pollution of water bodies.

This gap presents a clear opportunity for companies offering organic fertiliser solutions based on secondary raw materials: chicken manure, compost, and by-products of the sugar and biofuel industries. The EU's revised Fertilising Products Regulation (EU 2019/1009), which entered into force progressively through 2022, facilitates market access for fertilisers produced from organic or recycled materials and establishes a new CE-marking framework, thereby improving the regulatory environment for circular fertiliser producers across the EU single market.

7.7.

Precision agriculture and digital tools

Dutch expertise in precision agriculture and digital tools could improve Polish farms' productivity, lower production costs, and decrease externalities as a positive by-product. Dutch precision agriculture combines advanced sensors, artificial intelligence, satellite imagery, drones, and automated machinery to support data-driven farm management. By adopting these technologies, Polish farmers could continuously monitor soil moisture, nutrient levels, salinity, temperature, and crop health, enabling more precise decisions on irrigation, fertilization, and crop protection. This would reduce unnecessary input use while maintaining or increasing yields. The use of drones, satellite monitoring, and GPS technology would allow farmers to identify crop stress, nutrient deficiencies, pests, or irrigation problems at an early stage and apply targeted interventions only where needed. Currently precise crop-monitoring is used just to a small extent in Poland (total of 27 thousand farms in 2023), notably in farms in central Poland and Lubelskie Voivodeship, which is a leader in this aspect. Northern as well as south-eastern regions are regions where crop monitoring is almost not used and where the po-

tential for such technologies could be the greatest.

FIGURE 62
Number of farms using precise crop monitoring in 2023



Source: Own elaboration based on Bank Danych Lokalnych: Gospodarstwa rolne stosujące rolnictwo precyzyjne (<https://bdl.stat.gov.pl/bdl/start>).

The use of GPS technology is even lower with just below 2000 farms using this solution in 2023. Therefore, the benefits of increasing the use of GPS solutions in Poland could be felt in the whole country. However, it is logical to suspect that the demand for such technologies might be the greatest on the largest farms. They are situated in Western Poland, as well as Warmia and Mazury regions.

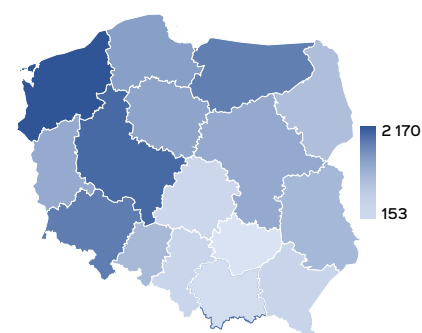
FIGURE 63
Number of farms with equipment for the application of plant protection products using GPS in 2023



Source: Own elaboration based on Bank Danych Lokalnych: Gospodarstwa rolne stosujące rolnictwo precyzyjne (<https://bdl.stat.gov.pl/bdl/start>).

Artificial intelligence and big data analytics would further help Polish farms optimize production by integrating information from weather forecasts, soil conditions, and crop performance. AI-based decision support systems can predict disease outbreaks, recommend optimal planting dates, improve crop rotations, and tailor fertilizer applications to individual fields. Such technologies would increase resilience to climate change while reducing production risks and environmental impacts.

FIGURE 64
Number of farms over 100 ha in 2023



Source: Own elaboration based on Bank Danych Lokalnych: Gospodarstwa rolne wg grup obszarowych użytków rolnych (<https://bdl.stat.gov.pl/bdl/start>).

These actions could be supplemented with the use of autonomous robots. They could perform weeding, seeding, soil sampling, and crop monitoring with high precision while minimizing soil compaction and reducing labour requirements. An additional avenue is to use robots for feed dispensing and cleaning in animal production facilities. In 2023 fewer than 14 thousand farms used autonomous robots of any kind. 55% of them were situated in Mazovia, Wielkopolskie, Lubelskie, Łódzkie and Kujawsko-Pomorskie Voivodeships. It is not to say that these regions reached saturation when it comes to agricultural robots. The rest of the country has a considerable untapped potential for such technologies.

Opportunities for Dutch companies in Poland

FIGURE 65
Number of farms using
autonomous robots in
their activities in 2023



Source: Own elaboration based on Bank Danych Lokalnych: Gospodarstwa rolne stosujące rolnictwo precyzyjne (<https://bdl.stat.gov.pl/bdl/start>).

Dutch digital technologies also offer significant opportunities for improving water management in Poland. Real-time sensors, satellite-based water stress monitoring, and precision irrigation systems can optimize irrigation scheduling and water application, while recirculating irrigation technologies reduce water consumption, nutrient losses, and environmental pollution. These solutions would be particularly valuable for Polish fruit and vegetable producers facing increasing drought risks. The farms that could be most interested in such technologies are the same as those with the greatest irrigation needs (see sub-chapter 7.2).

Overall, transferring Dutch expertise in precision agriculture would enable Polish farmers to modernize farm management, improve resource efficiency, lower operating costs, enhance climate resilience, and increase the long-term competitiveness and sustainability of Polish agriculture.



7.8.

Services supporting circularity in agriculture

Due to the high fragmentation of Polish farm structures, there is considerable untapped potential for service providers and integrators that can generate synergies through cooperative models. Poland's agri-food sector remains skewed toward low-value-added, largely unprocessed produce. The modern food processing infrastructure that exists is concentrated in a small number of subsectors: dairy, meat, frozen food and beverages. The vast majority of agricultural output is sold as undifferentiated commodities, limiting value capture.

This is a concern for horticultural production in particular. Though Poland is one of the biggest horticultural producers in the EU, the lack of cooperation among farmers results in suboptimal value capture compared to cooperatives¹⁴⁸. Fruit farms function to a large extent as independent entities, with limited ability to jointly plan production, invest in infrastructure, negotiate terms of sale or develop joint products. Fragmented producers have fewer opportunities to jointly invest in sorting, storing, cooling or processing. Furthermore, a single fruit can

be a source of many different value streams beyond immediate consumption. Those might be: higher value-added food products, functional ingredients, extracts, fibre, pectins, polyphenols, seed oils or ingredients for the cosmetics, pharmaceutical and nutraceutical industries. This means that it is possible to move from the "raw material sales" model to the "maximising value from biomass" model, in line with the circular economy model. Cooperation between fruit growers, processors, technology companies, food, cosmetics and pharmaceutical industries could make it possible to manage these streams in a more cascading way: first recovering the most valuable ingredients, and only then using the remaining biomass, e.g. for the production of feed, biogas or compost.

Vertical integration through contract farming, where processing companies enroll farmers as stipulated-price suppliers, and horizontal integration through producer cooperatives represent important structural tools for addressing fragmentation. Producer groups can capture economies of scale in procurement, marketing and

¹⁴⁸ A. Kagan, J. Kulawik (2024): Ewaluacja działania tworzenie i rozwój grup producentów i organizacji producentów rolnych finansowanych w ramach PROW 2014-2020. Instytut Ekonomiki Rolnictwa i Gospodarki Żywnościowej – Państwowy Instytut Badawczy.

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investment, while retaining farm-level independence. EU subsidy frameworks provide dedicated support for such groups, and their capacity to sell produce continuously through the year rather than only at harvest time (when prices are lowest) improves both farm incomes and supply chain efficiency.

Cooperatives might be an efficient avenue for capturing value for farmers. This is exemplified by the cooperatives' 83% market share in total agricultural production in the Netherlands¹⁴⁹. While in Poland this practice is virtually nonexistent with a total of only 647 production groups in Poland as of August 2026 (half of them in Wielkopolskie region)¹⁵⁰.

Digitalization offers additional levers: ICT-enabled advisory services, precision agriculture platforms, remote machinery maintenance, and on-line sales channels for local and ecological products can improve efficiency, strengthen producer-consumer links and reduce food waste along the value chain. Platforms enabling direct farm-to-consumer sales have begun emerging in Poland but remain well below their potential, particu-

larly for premium ecological and locally sourced products. This is a considerable untapped potential as notable use of digital management applications is only visible in the Mazovia region.

FIGURE 66
Number of farms using computer programs or mobile applications in their production in 2023



Source: Own elaboration based on Bank Danych Lokalnych: Gospodarstwa rolne stosujące systemy informacji zarządczej (<https://bdl.stat.gov.pl/bdl/start>).



¹⁴⁹ https://single-market-economy.ec.europa.eu/sectors/proximity-and-social-economy/social-economy-eu/cooperatives_en

¹⁵⁰ <https://www.gov.pl/web/arimr/rejestr-grup-producentow-rolnych>





The background of the slide features a photograph of an agricultural field. In the foreground, there are rows of young green plants in dark, rich soil. To the left, a long, low structure, likely a covered walkway or part of an irrigation system, extends into the distance. The sky above is filled with soft, white clouds, and the overall lighting suggests a bright, sunny day.

8

Financing and Support Mechanisms

Financing and Support Mechanisms

Building climate resilience in Polish agriculture requires capital on a scale that far exceeds the sector's own investment capacity. This chapter presents the four main layers of the financing landscape. Public grants, dominated by the CAP, remain the backbone of agricultural financing in Poland. At the same time, both EU and national policy are gradually shifting from pure grants towards repayable and blended instruments such as guarantees, preferential credit and carbon payments. Access to finance, however, remains uneven. The small and medium-sized farms that most need to adapt are precisely those that make the least use of the available instruments, which makes advisory support and aggregation as important as the funds themselves.

8.1. EU Funding Instruments

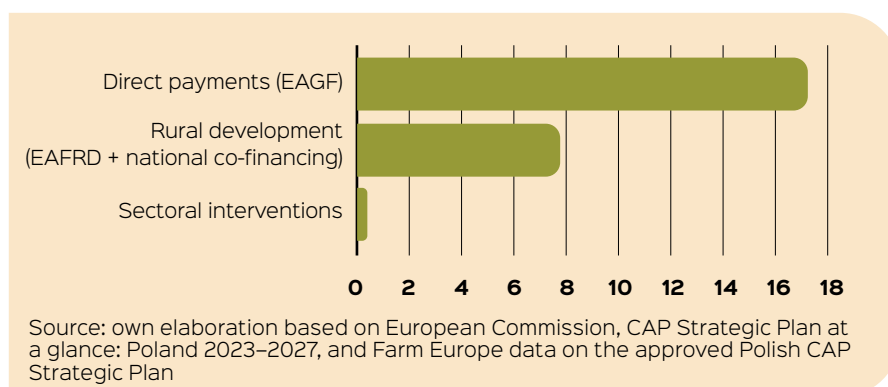
The single largest source of financing for Polish agriculture is the CAP Strategic Plan for 2023–2027, with a total public budget of over EUR 25 billion, of which approximately EUR 22 billion comes from the EU budget and over EUR 17 billion is channelled through direct payments¹⁵¹. The Plan is delivered through two funds – the European Agricultural Guarantee Fund (EAGF), which finances Pillar I direct payments to farmers and eco-schemes and the European Agricultural Fund for Rural Development (EAFRD), which finances Pillar II rural development investments¹⁵². For an average Polish farm, direct payments are not only income support but also the main source of investment capital.



¹⁵¹ https://agriculture.ec.europa.eu/cap-my-country/cap-strategic-plans/poland_en

¹⁵² European Commission: CAP Strategic Plan for Poland 2023–2027, https://agriculture.ec.europa.eu/cap-my-country/cap-strategic-plans/poland_en ; Farm Europe: Poland – CAP National Strategic Plan, <https://www.farm-europe.eu/blog-en/poland-cap-national-strategic-plan/>

FIGURE 67
Main budget components
of Poland's CAP Strategic
Plan 2023–2027 (EUR
billion)



What makes the current CAP particularly relevant for climate-resilient agriculture is its environmental and climate framework. Poland must dedicate at least 25% of the direct payment envelope (more than EUR 4.3 billion) to voluntary eco-schemes and at least 35% of Pillar II funding to environmental, climate, organic farming and animal welfare commitments¹⁵³.

The Polish eco-schemes are strongly soil- and water-oriented. The flagship ‘Carbon farming and nutrient management’ scheme pays for catch crops, no-till and strip-till cultivation, the incorporation of straw and manure and fertilisation planning, while separate schemes support integrated pest management and the retention of water on grassland. In effect, the CAP offers Polish farm-

ers annual payments for precisely the practices that form the foundation of climate resilience such as improving soil organic matter, protecting soil structure and retaining water. Pillar II complements these payments with investment support for farm modernisation, irrigation and small retention, agri-environment-climate commitments, organic farming and afforestation.

The distribution of CAP direct payments illustrates the structural challenge that EU funding faces in Poland. Among the 80% of beneficiaries receiving the lowest payments, over 90% are farms occupying less than 10 hectares (63.6% below 5 ha), while even the top 20% of beneficiaries consists mainly of medium-sized family farms of 10–50 hectares.

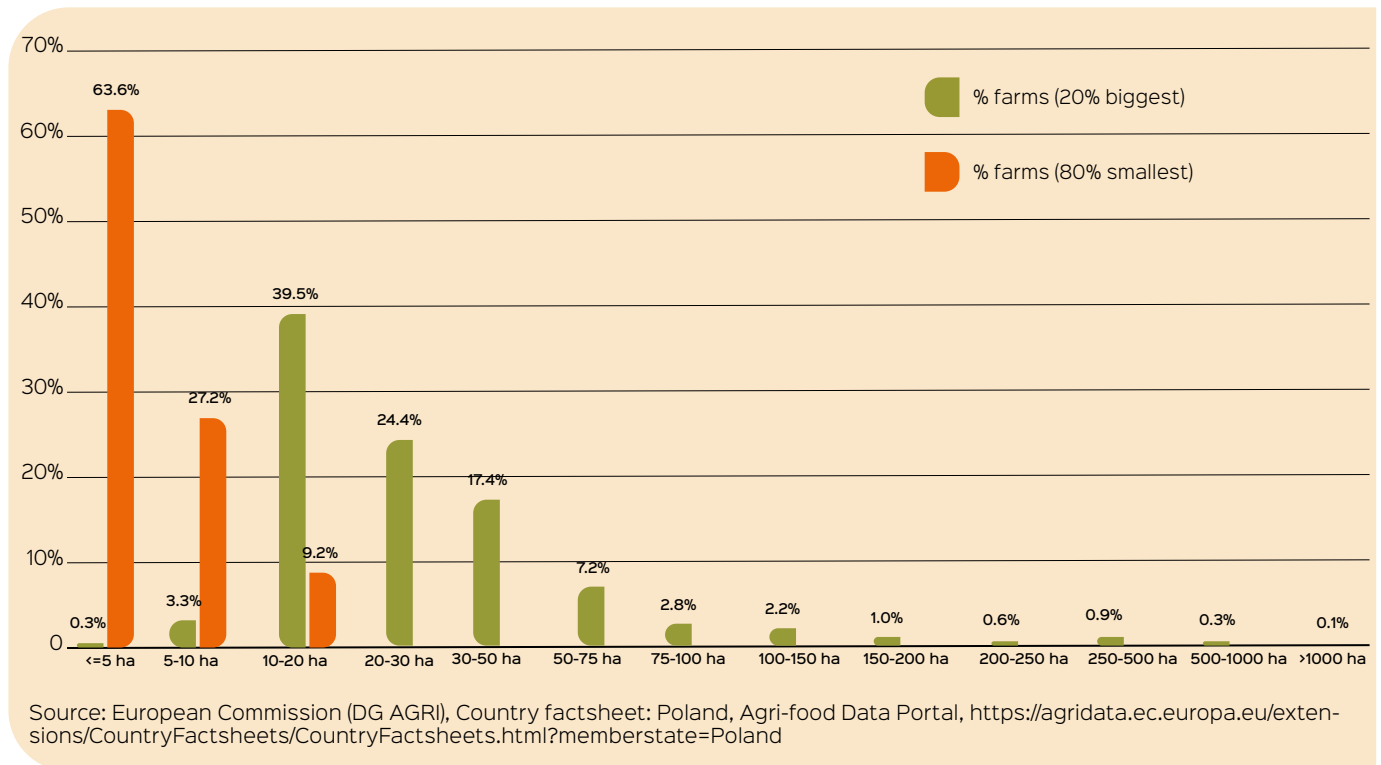
Holdings above 100 hectares account for barely 5% of even this top group¹⁵⁴. Because direct payments are area-based, CAP money in Poland is thus spread across a very large population of small recipients, which limits the investment leverage of any individual payment and explains why redistributive instruments, eco-schemes with mass reach and support for producer cooperation matter more in Poland than in Member States with concentrated farm structures. At the same time, the thin tail of large farms manages a disproportionate share of land and funds, making it a small but strategically important channel through which conditionality and greening requirements act on the agricultural landscape.

¹⁵³ IEEP (2023): Environment and climate assessment of Poland's CAP Strategic Plan, https://ieep.eu/wp-content/uploads/2023/02/Environment-and-climate-assessment-of-Poland's-CAP-Strategic-Plan_IEEP-2023.pdf

¹⁵⁴ <https://agridata.ec.europa.eu/extensions/CountryFactsheets/CountryFactsheets.html?memberstate=Poland>

Financing and Support Mechanisms

FIGURE 68
Distribution of CAP
support in Poland, 2022



The second major EU stream is the Recovery and Resilience Facility, implemented in Poland through the National Recovery Plan (KPO). The agri-food sector has a dedicated envelope of almost EUR 2.2 billion (about 6% of the entire KPO) of which some EUR 1.3 billion flows through investment A1.4.1 on shortening supply chains and strengthening the resilience of the food system¹⁵⁵. Administered by the Agency for Restructuring and Modernisation of Agriculture (ARiMR), the KPO

finances the modernisation of small and medium processing plants, storage and distribution centres, on-farm grain silos, digital 'Agriculture 4.0' technologies, renewable energy and the replacement of asbestos roofing on farm buildings. These investments improve both the competitiveness and the crisis resilience of the food chain. Because KPO funds must be spent within a short time horizon (essentially by 2026), they have acted as a rapid injection of investment

capital, complementing the slower, programme-based CAP support.

Beyond income and investment support, the EU finances research and innovation. Horizon Europe's Cluster 6 ("Food, Bioeconomy, Natural Resources, Agriculture and Environment") funds international consortia working on soil health, water management, sustainable farming systems and food chains and the EU Mission "A Soil Deal for Europe" finances a net-

¹⁵⁵ ARiMR: Krajowy Plan Odbudowy i Zwiększania Odporności – działania wdrażane przez ARiMR, <https://www.gov.pl/web/arimr/krajowy-plan-odbudowy--dzialania-wdrazane-przez-arimr>; <https://www.okiemrolnika.pl/prawo-i-finanse/item/8022-co-dla-rolnikow-z-krajowego-planu-odbudowy>

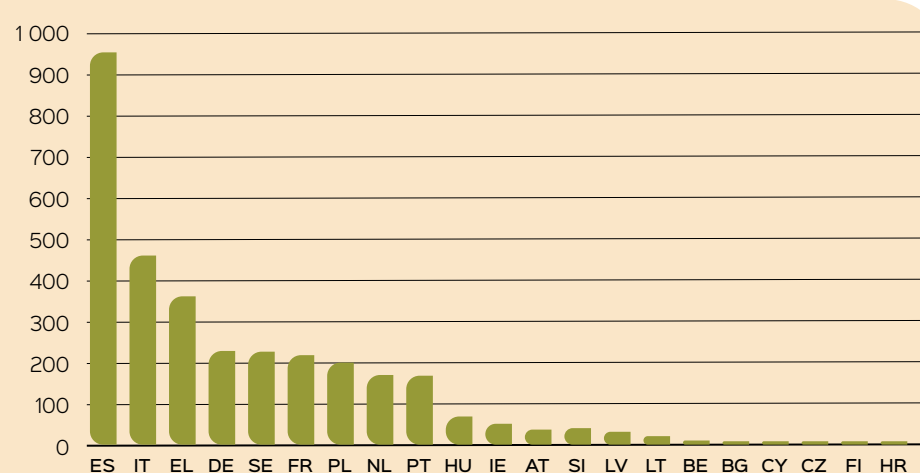
work of living labs and light-house farms demonstrating soil-improving practices¹⁵⁶. Because Horizon Europe requires multinational consortia, it is a natural vehicle for cooperation between Polish institutes and universities and Dutch partners such as Wageningen University and Research.

At the applied end of the innovation chain, the CAP cooperation measure finances European Innovation Partnership for Agricultural Productivity and Sustainability (EIP-AGRI) Operational Groups, in which farmers, advisers and researchers jointly develop practical solutions. With 200 operational groups launched by 2022, Poland

ranks seventh in the EU, well behind the leaders Spain, Italy and Greece, but ahead of most Central European countries¹⁵⁷. However, the figure looks less impressive once compared with the size of the sector. With some 1.4 million farms, Poland has proportionally far fewer operational groups per farm than the Netherlands, which reaches a similar absolute number (170) with less than one-twentieth of Poland's farm population. This suggests that the constraint is not the availability of EU funding (EIP cooperation is financed under the CAP rural-development pillar) but the absorption capacity of the innovation ecosystem. What is lacking is the density of broker organisations,

advisers and research-practice linkages needed to assemble consortia of farmers, scientists and businesses around concrete problems. The EIP instrument is particularly relevant here. Operational groups are a natural vehicle for testing climate-adaptation solutions (water management, soil health, drought-resistant varieties) on real farms and their multi-actor format is well suited to Polish-Dutch cooperation, whether by twinning groups across borders under Horizon Europe's thematic networks or by drawing on the Dutch experience of embedding advisers and applied research in farmer-led innovation.

FIGURE 69
Number of EIP-AGRI operational groups per Member State, 2022



Source: European Commission, Directorate-General for Agriculture and Rural Development, Country factsheet: Poland, Agri-food Data Portal, <https://agridata.ec.europa.eu/extensions/CountryFactsheets/CountryFactsheets.html?memberstate=Poland>

¹⁵⁶ European Commission, Horizon Europe Cluster 6: Food, Bioeconomy, Natural Resources, Agriculture and Environment, https://research-and-innovation.ec.europa.eu/funding/funding-opportunities/funding-programmes-and-open-calls/horizon-europe/cluster-6-food-bioeconomy-natural-resources-agriculture-and-environment_en ; EU Mission: A Soil Deal for Europe, https://research-and-innovation.ec.europa.eu/funding/funding-opportunities/funding-programmes-and-open-calls/horizon-europe/eu-missions-horizon-europe/soil-deal-europe_en

¹⁵⁷ <https://agridata.ec.europa.eu/extensions/CountryFactsheets/CountryFactsheets.html?memberstate=Poland>

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Another important funding source is the LIFE Programme, the EU's dedicated instrument for environmental and climate action¹⁵⁸. The LIFE Climate Change Mitigation and Adaptation sub-programme manages approximately EUR 905 million during the 2021–2027 period and supports innovative projects that can be replicated and scaled across Europe¹⁵⁹. Agricultural projects focusing on drought adaptation, ecosystem restoration, water management, biodiversity enhancement and nature-based solutions are particularly well aligned with LIFE priorities. The programme has already demonstrated its value as a catalyst for introducing innovative environmental technologies and approaches that may subsequently be mainstreamed through larger funding instruments.

Additional opportunities are available through EU Cohesion Policy funds, including the European Regional Development Fund, the Cohesion Fund, the Just Transition Fund and the Recovery and Resilience Facility. While not exclusively addressed to individual farms, these instruments can support investments in water infra-

structure, digitalisation, renewable energy, research facilities and regional climate adaptation strategies. Their importance is likely to increase as climate resilience becomes a central objective across multiple sectors of the European economy.



¹⁵⁸ <https://www.gov.pl/web/nfosisgw/program-life>

¹⁵⁹ https://climate.ec.europa.eu/eu-action/eu-funding-climate-action/life-climate-change-mitigation-and-adaptation_en

8.2.

Polish National and Regional Funds

The National Fund for Environmental Protection and Water Management (NFOŚiGW) is the cornerstone of Poland's environmental-financing system, having disbursed close to PLN 96 billion (EUR 22 billion) over its first three decades on projects spanning water and wastewater management, renewable energy, energy efficiency, biodiversity and climate adaptation¹⁶⁰. Of particular relevance to agriculture are its water-retention and flood- and drought-prevention programmes, its role administering FEnIKS climate-adaptation funding and dedicated agricultural schemes such as the National Programme for Environmental Regeneration of Soils by Liming and the Removal of Agricultural Foils and Other Agricultural Waste¹⁶¹. Its flagship programme “Energia dla wsi” (Energy for the Countryside), financed from the EU Modernisation Fund, has a budget of PLN 3 billion (EUR 685 million) for 2022–2030 and offers farmers and energy cooperatives grants of up to 65% of eligible costs and loans of up to 100% for agricultural biogas plants, photovoltaics, wind

turbines, small hydropower and energy storage¹⁶². Demand has far exceeded initial allocations. Applications in the first call, dominated by biogas projects, amounted to almost twice the original budget, confirming both the investment need and the central role of manure- and residue-based biogas in closing nutrient and energy loops on Polish farms. NFOŚiGW also operates Poland's share of the EU Emissions Trading System Modernisation Fund. As the largest beneficiary, Poland is entitled to roughly 120 million allowances (43.4% of the pool), potentially worth over EUR 11 billion, a significant reservoir for low-carbon and energy-transition investment including in rural areas¹⁶³.

The sixteen voivodeship environmental funds (WFOŚiGW) complement the national fund with smaller regional grants and loans, for example for manure storage, small retention and farm-level environmental investments, while the agricultural tax system offers an investment relief that allows farmers to deduct part of documented

¹⁶⁰ Ministry of Climate and Environment, Gov.pl, 30 years of the National Fund for Environmental Protection and Water Management, <https://www.gov.pl/web/climate/30-years-of-the-national-fund-for-environmental-protection-and-water-management>

¹⁶¹ <https://www.gov.pl/web/nfosigw>

¹⁶² MRiRW: Energia dla wsi, <https://www.gov.pl/web/rolnictwo/energia-dla-wsi>; <https://www.gov.pl/web/rolnictwo/program-energia-dla-wsi-zwiekszenie-budzetu-do-3-mld-zl>

¹⁶³ Forum Energii, “Whom to ask how Poland spends billions from the Modernisation Fund?”, <https://www.forum-energii.eu/en/whom-to-ask-how-poland-spends-billions-from-the-modernisation-fund>

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expenditure on environmental and livestock infrastructure. They co-finance local and regional environmental and adaptation projects and act as intermediaries for national programmes. Following the catastrophic 2024 floods in southern Poland, the WFOŚiGW network administered grant support to help affected communities restore water and environmental infrastructure¹⁶⁴.

Moreover, Bank Gospodarstwa Krajowego (BGK), the wholly state-owned development bank, is the principal implementing body for EAFRD financial instruments in Poland and administers a range of national socio-economic programmes. Its guarantee experience makes it a natural partner for scaling blended agricultural finance. The Agency for Restructuring and Modernisation of Agriculture (ARiMR) is Poland's CAP paying agency,

responsible for disbursing direct payments and rural-development support under the Strategic Plan¹⁶⁵. Bank Ochrony Środowiska (BOŚ), majority-owned by NFOŚiGW, specialises in green lending to municipalities, enterprises and, increasingly, agricultural investments in renewables and efficiency¹⁶⁶.

Additionally, it is relevant to mention the system of subsidised crop and livestock insurance, under which the state budget covers up to 65% of the insurance premium for policies against drought, spring frost, hail, flooding and adverse overwintering^{167,168}. In recent years the annual budget for premium subsidies has been in the order of PLN 0.9–1.2 billion (EUR 206–274 million) (PLN 920 million (EUR 210 million) in 2025), supporting the insurance of roughly 3.8 million hectares of crops¹⁶⁹. Nevertheless, only about 16% of producers use subsidised

policies¹⁷⁰, so a substantial part of the sector's growing climate risk remains uninsured. This gap is intended to narrow through a reform adopted by the government in 2026, which introduces simplified premium subsidies independent of soil class, an extended catalogue of insurable crops, clarified loss-assessment rules and adjustments to the state-backed re-insurance of drought indemnities^{171,172}. In parallel, ARiMR administers preferential credit lines with interest subsidies and ad hoc disaster assistance after droughts, frosts and floods. This support in practice functions as an expensive and unpredictable substitute for insurance.

164 European Environment Agency, Climate-ADAPT, "Adaptacja do zmian klimatu – Usuwanie skutków powodzi 2024 r". <https://climate-adapt.eea.europa.eu/en/mission/funding-inactive/opportunities-inactive/adaptacja-do-zmian-klimatu-climate-change-adaptation>

165 European Commission / EU CAP Network, Poland' country page, https://eu-cap-network.ec.europa.eu/countries/poland_en

166 Bank Ochrony Środowiska (BOŚ), <https://www.bosbank.pl/>

167 <https://www.gov.pl/web/rolnictwo/ubezpieczenie-upraw-rolnych-i-zwierzat-gospodarskich-w-2026-r-z-doplata-skladki-z-budzetu-panstwa>

168 <https://www.portalsamorzadowy.pl/polityka-i-spolescenstwo/projekt-65-proc-doplatty-do-skladki-ubezpieczenia-upraw-i-zwierzat-gospodarskich-w-2026-r,632709.html>

169 <https://www.gov.pl/web/rolnictwo/ubezpieczenie-upraw-rolnych-i-zwierzat-gospodarskich-w-2026-r-z-doplata-skladki-z-budzetu-panstwa>; <https://www.portalsamorzadowy.pl/polityka-i-spolescenstwo/projekt-65-proc-doplatty-do-skladki-ubezpieczenia-upraw-i-zwierzat-gospodarskich-w-2026-r,632709.html>; <https://czublun.pl/prawo-gospodarcze/rzad-zwieksza-doplatty-do-ubezpieczen-rolnych/>

170 <https://www.portalsamorzadowy.pl/polityka-i-spolescenstwo/projekt-65-proc-doplatty-do-skladki-ubezpieczenia-upraw-i-zwierzat-gospodarskich-w-2026-r,632709.html>

171 [https://orka.sejm.gov.pl/Druki10ka.nsf/0/FDC35095FC34EA02C1258DF8003326F2/\\$File/2581.pdf](https://orka.sejm.gov.pl/Druki10ka.nsf/0/FDC35095FC34EA02C1258DF8003326F2/$File/2581.pdf)

172 <https://www.gov.pl/web/premier/projekt-ustawy-o-zmianie-ustawy-o-ubezpieczeniach-upraw-rolnych-i-zwierzat-gospodarskich-wraz-z-uchwala-w-sprawie-udzielenia-zgody-na-dokonanie-notyfikacji-komisji-europejskiej-zmiany-programu-pomocy-dla-producentow-rolnych-sa1070262023n-ze-zmiana-zawartaw-sa1165862024n-doplatty-do-skladek-z-tytulu-ubezpieczen-upraw-rolnych-i-zwierzat-gospodarskich-oraz-czesciowe-refinansowanie-odszkodowan-naleznich-producentom-rolnym-z-tytulu-szkod-spowodowanych-przez-susze-reasekuracja>

8.3.

Dutch and International Climate and Innovation Funds



The Netherlands maintains one of the densest bilateral agricultural support networks in Poland. The Netherlands Agricultural Network (LAN) team at the Dutch Embassy in Warsaw, part of a worldwide network of agricultural counsellors of the Dutch Ministry of Agriculture, initiates and co-finances co-operation projects, trade missions and knowledge exchange in areas directly relevant to climate-resilient agriculture, including soil quality, circular agriculture and horticulture¹⁷³. The most instructive example is the Partners for International Business (PIB) project “Soil Improvement Poland” which ran from 2022 until its completion in 2025 as a three-year public-private partnership coordinated by the Netherlands Enterprise Agency (RVO) and implemented by a cluster of Dutch companies together with Polish partners, combining trial fields, trade fairs and an online knowledge module aimed at reaching some 100 000 Polish farmers with soil management know-how¹⁷⁴. A follow-up manure

valorisation mission in 2025 extended this cooperation to the transfer of organic matter and nutrient management solutions for rebuilding the fertility of Poland’s light soils¹⁷⁵. For Dutch agri-tech companies, RVO instruments of this kind de-risk market entry. For Polish farmers, they deliver subsidised access to technology and knowledge.

International financial institutions provide large-scale climate finance that exceeds the scope of both the CAP and national funding instruments. The most significant example to date is the Odra-Vistula Flood Management Project, a EUR 460 million World Bank loan co-financed by the EU Cohesion Fund and the Council of Europe Development Bank, which finances flood protection for around 15 million people living in the Odra and Upper Vistula basins and strengthens Poland’s institutional capacity for flood risk management¹⁷⁶. The European Investment Bank plays a growing role as well. It auctions the emission allowances

173 RVO: Netherlands Agricultural Network (LAN), <https://english.rvo.nl/topics/international-network/agricultural-network> ; Netherlands Embassy in Poland – Agriculture and food processing, <https://www.netherlandsandyou.nl/web/poland/themes/agriculture-food-processing>

174 Agroberichten Buitenland: Poland – launch of project on Soil Improvement (PIB), <https://www.agroberichtenbuitenland.nl/actueel/nieuws/2022/11/11/poland-launch-of-project-on-soil-improvement> ; Poland and the Netherlands collaborating on soil quality and manure export initiatives (2025), <https://www.agroberichtenbuitenland.nl/actueel/nieuws/2025/04/17/as14-poland>

175 Netherlands Ministry of Agriculture, Fisheries, Food Security and Nature / LAN team of the Embassy of the Netherlands in Warsaw, Poland and the Netherlands collaborating on soil quality and manure export initiatives, Agroberichten Buitenland, 17.04.2025, <https://www.agroberichtenbuitenland.nl/actueel/nieuws/2025/04/17/as14-poland>

176 World Bank (2015): World Bank Board Approves US\$504 Million Support to Odra-Vistula Flood Management Project, <https://www.worldbank.org/en/news/press-release/2015/07/23/world-bank-board-approves-us504-million-support-to-odra-vistula-flood-management-project>

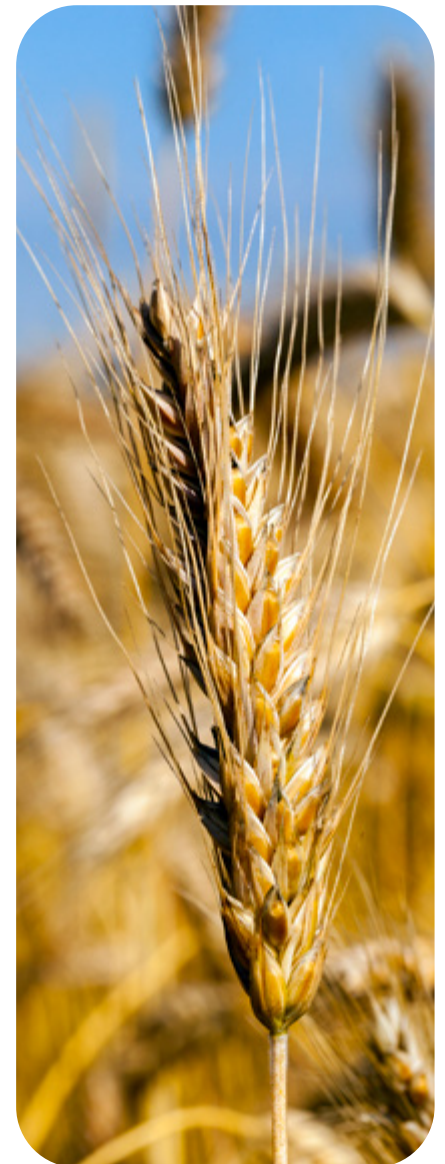
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that feed the EU Modernisation Fund, from which “Energia dla wsi” is financed, with NFOŚiGW acting as national operator. It was also the EIB that approved the expansion of the programme’s budget to the PLN 3 billion (EUR 685 million) noted in section 8.2, up from an initial PLN 1 billion (EUR 228 million). The Bank also provides credit lines to banks and leasing companies operating in Poland that are on-lent to farms and agri-food companies¹⁷⁷. In addition, the European Bank for Reconstruction and Development (EBRD) remains one of the largest institutional investors in Poland, with EUR 1.35 billion committed across 44 projects in 2025 (its third-largest market that year), overwhelmingly in the private sector and increasingly in the green economy¹⁷⁸. Its 2025 Food and Agribusiness Strategy roughly doubles its earlier green targets and supports enterprises across the whole food value chain. These institutions bring not only capital but also project preparation standards (environmental safe-

guards, resettlement practice, procurement discipline) that raise the quality of national climate-adaptation investment.

For innovation-oriented co-operation, the most accessible channels are the EU instruments described in section 8.1, Horizon Europe consortia, the Soil Mission living labs and EIP-AGRI Operational Groups, in which Dutch knowledge institutions are among the most frequent participants in Europe. Practical Polish–Dutch projects can therefore be built by pairing Polish demonstration farms, advisory centres and research institutes (such as IUNG-PIB in Puławy) with Dutch technology providers and research organisations, using EU innovation money as the joint funding base and RVO and LAN instruments to finance the business-to-business layer of cooperation. This division of labour – EU funds for research and demonstration, Dutch instruments for market development – has already proven effective in

the soil quality partnership and can be replicated for water-efficient horticulture, precision livestock farming and manure processing.



¹⁷⁷ European Bank for Reconstruction and Development (EBRD), “EBRD invested €1.35 billion in Poland in 2025”, press release, 2026, <https://www.ebrd.com/home/news-and-events/news/2026/ebird-invests-1-35-billion-in-poland-in-2025.html>; Narodowy Fundusz Ochrony Środowiska i Gospodarki Wodnej (NFOŚiGW), “Energia dla wsi”, Gov.pl, <https://www.gov.pl/web/nfosigw/energia-dla-wsi>; “Energia dla wsi” – zwiększenie budżetu do 3 mld zł”, ppr.pl, <https://www.ppr.pl/wiadomosci/energia-dla-wsi-zwiekszenie-budzetu-do-3-mld-zl>; European Investment Bank (EIB), “Poland: Mid-Caps to get green financing support as EIB bolsters lending by Credit Agricole Bank Polska”, press release 2025-311-EN, 4 August 2025, <https://www.eib.org/en/press/all/2025-311-polish-mid-caps-to-get-green-financing-support-as-eib-bolsters-lending-by-credit-agricole-bank-polska>; European Investment Bank (EIB), “Polish mid-sized companies to gain financing through new €200 million EIB loan to BNP Paribas Leasing Services”, press release 2025-318-EN, 1 September 2025, <https://www.eib.org/en/press/all/2025-318-polish-mid-sized-companies-to-gain-financing-through-new-eur200-million-eib-loan-to-bnp-paribas-leasing-services>

¹⁷⁸ European Investment Bank (EIB), “Poland: EIB and BPCE Equipment Solutions Polska sign first agreement under €200 million programme to step up financing for SMEs and green transition”, press release, 9 July 2026, <https://www.eib.org/en/press/all/2026-243-eib-and-bpce-equipment-solutions-polska-sign-first-agreement-under-eur200-million-programme-to-step-up-financing-for-smes-and-green-transition-in-poland>

8.4.

Public-Private Partnerships and Blended Finance

Public funding alone cannot deliver the scale of investment that climate adaptation in agriculture requires within the available timeframe. Blended instruments, which use public money to unlock private credit and capital, are therefore the fastest-growing layer of agricultural finance in Poland.

The central instrument is the Agricultural Guarantee Fund (FGR) operated by Bank Gospodarstwa Krajowego, which provides free guarantees covering up to 80% of a loan (up to PLN 5 million for a farmer and PLN 10 million for a processor (up to EUR 1.1 million for a farmer and EUR 2.3 million for a processor)) together with interest subsidies on working-capital credit¹⁷⁹. By the end of November 2025 the FGR had granted PLN 3.9 billion (EUR 891 million) of guarantees, securing almost PLN 5 billion (EUR 1.1 billion) of bank credit for farms and food companies¹⁸⁰. Its successor under the current CAP, FGR Plus with the 'Agromax' guarantee, is capitalised with PLN 681.5 million (EUR 155.7 million) from the CAP Strategic Plan and is expected to generate around PLN 3 billion (EUR 685 mil-

lion) of new lending. Notably, the interest subsidy can cover up to 100% of interest for young farmers and for investments that serve climate, environmental or Farm to Fork objectives – an explicit attempt to steer private credit towards climate-resilient investment¹⁸¹.

The subsidised crop insurance system described in section 8.2 is itself a public-private partnership. The state sets the framework and pays most of the premium, while private insurers underwrite and distribute the risk. The same logic, public de-risking of a private market, underpins the planned reinsurance of drought risk and could be extended to instruments such as index-based (parametric) insurance, in which Dutch and international insurers have considerable experience. In farm investment, hybrid financing is increasingly the norm rather than the exception. A typical modern barn, greenhouse or biogas installation combines a CAP or KPO grant, a bank loan secured by a BGK guarantee, supplier credit or leasing from the technology provider and the farmer's own contribution. Dutch suppliers

¹⁷⁹ Ministerstwo Rolnictwa i Rozwoju Wsi: Fundusz Gwarancji Rolnych Plus, <https://www.gov.pl/web/rolnictwo/fundusz-gwarancji-rolnych-plus>

¹⁸⁰ BGK: Gwarancja dla sektora rolnego (Fundusz Gwarancji Rolnych), <https://www.bgk.pl/produkty/gwarancja-dla-sektora-rolnego/>

¹⁸¹ MRiRW: Nowa gwarancja z Funduszu Gwarancji Rolnych Plus z dotacją na spłatę odsetek dla sektora rolno-spożywczego, <https://www.gov.pl/web/rolnictwo/nowa-gwarancja-z-funduszu-gwarancji-rolnych-plus-z-dotacja-na-splate-odsetek-dla-sektora-rolno-spozywczego>

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of greenhouse, dairy and manure-processing technology routinely participate in such structures through vendor financing and long-term service contracts, becoming co-financiers of Polish farm modernisation.

The most recent layer of private climate finance is the voluntary carbon market. Soil carbon programmes pay farmers for the verified adoption of regenerative practices such as cover crops, reduced tillage and improved rotations¹⁸². Agreeena, the largest such programme in Europe and active in Poland, achieved Verra verification in 2025 of 2.3 million credits on 1.6 million hectares, with initial payouts of EUR 32–36 per certificate, across multiple European countries, including Poland¹⁸³. These schemes monetise practices that CAP eco-schemes already reward, providing a second, private source of income. Their main constraint in Poland is informational: only a small minority of farm-

ers report understanding carbon credits at all¹⁸⁴.

The term covers two mechanisms with very different consequences. Under offsetting, the verified reduction becomes a tradable certificate sold to any buyer, typically a company outside the food chain, which retires it against an unrelated footprint; the certificate leaves agriculture and the relationship ends with the sale. Under inseting, the same tonne stays inside the value chain that produced it, claimed by the firm that buys the farmer's crop and is counted against that firm's Scope 3 emissions¹⁸⁵. The consequence is commercial rather than accounting: inseting makes a processor's reported footprint depend on what happens in its suppliers' fields, giving it an incentive to offer longer contracts, agronomic advice, co-financing and a share of the transition risk. Programmes available to Polish farmers today operate mainly on an offsetting logic.

Offsetting carries caveats that should be made explicit before it is presented to farmers as a financing mechanism. Additionality is hard to demonstrate where a practice is already rewarded by eco-schemes or required by conditionality. Soil carbon is reversible, so issuers impose five- to ten-year commitments. Measurement rests largely on modelling, resulting in wide confidence intervals and high verification costs. Moreover, once a reduction is sold externally, it can no longer be claimed by the farmer. Regulation is tightening in response to precisely these weaknesses. The EU Carbon Removals and Carbon Farming (CRCF) Regulation establishes a voluntary EU-wide framework for quantification, additionality, long-term storage, and sustainability, including a Union registry¹⁸⁶, while the Empowering Consumers Directive prohibits product claims such as "climate neutral" that rest on offsetting outside the product's own value chain,

182 Pachura, A. et al. (2025), Legal and Economic Framework for Carbon Farming and Carbon Certificates in the EU Using the Example of Poland, *Sustainability* 17(1):232, <https://doi.org/10.3390/su17010232>

183 Agreeena, <https://agreeena.com/farmer/>; verification milestones: <https://grownews.com/agreena-latest-news/>; farmer payout levels: <https://www.businesswire.com/news/home/20230613878579/en/>

184 Legal and Economic Framework for Carbon Farming and Carbon Certificates in the EU Using the Example of Poland, *Sustainability* 2025, 17(1), 232, <https://www.mdpi.com/2071-1050/17/1/232>

185 On the distinction, and on the treatment of inseting under Scope 3 claims, see Klim: Achieve Scope 3 targets through regenerative agriculture, <https://www.klim.eco/en/companies/scope-3>

186 Regulation (EU) 2024/3012 of the European Parliament and of the Council of 27 November 2024 establishing a Union certification framework for permanent carbon removals, carbon farming and carbon storage in products (CRCF), <https://eur-lex.europa.eu/eli/reg/2024/3012>; implementing rules on certification schemes and audits in Implementing Regulation (EU) 2025/2358. See also European Commission, Carbon removals and carbon farming, https://climate.ec.europa.eu/eu-action/carbon-removals-and-carbon-farming_en

from 27 September 2026 onwards¹⁸⁷. For a food company, this removes much of the marketing value of external credits while preserving the value of reductions achieved within its own supply base.

Insetting is already operating in Poland. Klim contracts with food companies to reduce emissions on farms within their own supply chains and works with more than 4 000 farmers, principally in Germany and Poland¹⁸⁸. The Bayer–ADM collaboration is centred on Poland. A feasibility study covering roughly 9 000 hectares of oilseed rape found that emissions were some 15% lower on hectares using at least one regenerative practice and up to 40% lower where the full set of practices was adopted. The scheme has since extended to maize, wheat and barley across Eastern Europe. ADM compensates farmers for each qualifying hectare, while measurement and verification are supplied by Bayer's digital tools together with Trinity Agtech's Sandy platform¹⁸⁹. The con-

trast with offsetting is practical. Offsetting is easier to enter and pays sooner, but inseting ties the carbon benefit to the Scope 3 obligations now falling on processors and retailers, and shifts the work of organising and financing a group of suppliers from the individual farm to the buyer.

Taken together, the financing landscape provides a comprehensive set of instruments – CAP and KPO grants for public-good practices and farm investment, national funds for insurance, energy and water, guarantees and preferential credit to mobilise bank lending, carbon markets to monetise practice change and international loans for large adaptation infrastructure. The binding constraints are on the demand side. Small farms lack the knowledge, cash flow and scale to combine these instruments and producer cooperation, which is the natural aggregation mechanism, remains weak. This defines the most promising space for Polish–Dutch cooperation in

financing: joint development of bankable project pipelines around producer groups and cooperatives, Dutch participation in blended structures (technology suppliers, agribanks and insurers alongside BGK guarantees and EU funds) and the transfer of the Dutch experience of cooperative agricultural finance, in which farmer-owned institutions historically solved precisely the access-to-capital problem that Polish agriculture faces today.

187 Directive (EU) 2024/825 of the European Parliament and of the Council of 28 February 2024 (empowering consumers for the green transition), Annex I to Directive 2005/29/EC as amended; <https://eur-lex.europa.eu/eli/dir/2024/825/oj>. Member States were required to transpose the Directive by 27 March 2026 and the national rules apply to traders from 27 September 2026.

188 AgTechNavigator, Klim expands regenerative farming platform into UK, 10 September 2025, <https://www.agtechnavigator.com/Article/2025/09/10/klim-expands-regenerative-farming-platform-into-uk/>. See also Klim, Achieve Scope 3 targets through regenerative agriculture, <https://www.klim.eco/en/companies/scope-3>

189 ADM (2024): Farmers Achieve Lower Carbon Emissions with the Help of a New Regenerative Agriculture Collaboration in Europe, <https://investors.adm.com/news/news-details/2024/Farmers-Achieve-Lower-Carbon-Emissions-with-the-Help-of-a-New-Regenerative-Agriculture-Collaboration-in-Europe/default.aspx>; Sustainability Magazine: Bayer & ADM – Cutting Carbon Emissions on Europe's Farms, <https://sustainabilitymag.com/articles/bayer-adm-cutting-carbon-emissions-on-europes-farms>

