OECD Agriculture and Food Policy Reviews

Policies for the Future of Farming and Food in Croatia

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Foreword

The OECD Council decided to open accession discussions with Croatia on 25 January 2022. On 10 June 2022, the Council adopted the Roadmap for the accession of Croatia to the OECD Convention [C/MIN(2022)23/FINAL] (the Roadmap) setting out the terms, conditions and process for accession to the OECD. The Roadmap provides that in order to allow the Council to take an informed decision on the accession of Croatia, Croatia will undergo in-depth reviews by OECD technical committees listed in the Roadmap, including the Committee for Agriculture (COAG).

This report was prepared to support the accession review discussion of the Committee for Agriculture with Croatia. It reflects information provided by Croatia in responses to an OECD questionnaire and subsequent follow-up, information collected at the OECD fact-finding mission to Croatia on 12-15 September 2023, as well as desk research and data collection by the OECD Secretariat. The report also reflects discussions held by the COAG on 23 May and 30 October 2024.

Over the past three decades, Croatia has achieved remarkable economic and social progress. Its agricultural policies and objectives have evolved significantly, shaped in part by key reforms undertaken during its accession to the World Trade Organization and the European Union. Reconciling agro-food productivity, sustainability and resilience is a challenge common to all countries, while also being unique to each country's specific context and objectives. This report presents evidence and policy recommendations that aim to inform future actions by Croatia to improve the effectiveness of its agricultural and food policies, with a view to developing stronger and more integrated food systems, strengthening the enabling environment for agro-food growth, promoting environmental sustainability and resilience, and strengthening the agricultural knowledge and innovation system.

In accordance with paragraph 28 of the Roadmap and upon request of Croatia, the Committee for Agriculture agreed to declassify this report and publish it under the authority of the Secretary-General, in order to allow a wider audience to become acquainted with its content. Publication of this document and the analysis and recommendations contained therein do not prejudge in any way the outcome of evaluations conducted as part of Croatia's accession process to the OECD.

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Acronyms

AKIS	Agricultural Knowledge and Innovation System
AMEUP	Agency for Mobility and EU Programmes
AMS	Area Monitoring System
APO	Associations of producer organisations
APPRRR	Croatia's Paying Agency in Agriculture, Fisheries and Rural Development (*Agencija za plaćanja u poljoprivredi, ribarstvu i ruralnom razvoju*)
ARKOD	Croatia's system for digital identification of land parcels
ASC	Advisory Service Croatia
ASHE	Agency for Science and Higher Education
ASOO	Agency for Vocational Education and Training
AWU	Annual Working Unit
BERD	Business Expenditure on Research and Development
BISS	EU Basic Income Support for Sustainability
CAEI	Croatian Agriculture Extension Institute
CAP	Common Agricultural Policy of the European Union
CARDS	Community Assistance for Reconstruction, Development and Stabilisation programme
CBS	Croatian Bureau of Statistics
CCT	EU Common Customs Tariff
CEFTA	Central European Free Trade Agreement
CES	Croatian Employment Service
CIS	EU Coupled Income Support
CIS-YF	EU Complementary Income Support for Young Farmers
CMO	EU Common market organization
CNDP	Complementary national direct payments
CPVO	Community Plant Variety Office
CRISS	EU Complementary redistributive income support for sustainability
CROFQ	Croatian Qualifications Framework
CSP	CAP Strategic Plan
DESI	EU Digital Economy and Society Index
DIGIT	Digital, innovative and green technologies project
DPSDA	Directorate for Professional Support to the Development of Agriculture
EAFRD	European Agricultural Fund for Rural Development
EAGF	European Agricultural Guarantee Fund
EC	European Commission
EEA	European Economic Area
EFSA	European Food Safety Agency
EIP	European Innovation Partnership
EPO	European Patent Organisation
ERDF	European Regional Development Fund
ESF	European Social Fund
ESIF	European Structural and Investment Funds
ETS	Emissions Trading System
EU	European Union
EUFRAS	European Forum for Agricultural and Rural Advisory Services
EUR	Euro

FCFS	First-come-first-served
FDI	Foreign Direct Investment
FSC	Forest Stewardship Council
FTTP	Fibre to the Premises
FVA	Foreign Value Added
GAEC	Good Agricultural and Environmental Condition
GATT	General Agreement on Tariffs and Trade
GBARD	Government Budget Allocation for Research and Development
GDP	Gross Domestic Product
GDPR	EU General Data Protection Regulation
GERD	Gross Domestic Expenditure on Research and Development
GHG	Greenhouse Gas
GII	Global Innovation Index
GSP	Generalised Scheme of Preferences
GVC	Global value chains
HAH	Croatian Food Agency
HAMAG-BICRO	Croatian Agency for SMEs, Innovation and Investments
HAP	Croatian Agricultural Agency
HAPIH	Croatian Agency for Agriculture and Food
HBOR	Croatian Bank for Reconstruction and Development
HGK	Croatian Chamber of Economy
HRK	Croatian Kuna
HRZZ	Croatian Science Foundation
HS	Harmonised System
HZN	Croatian Standards Institute
IALB	International Academy of Agricultural and Home Economics Consultants
IBO	Inter-branch organisation
ICT	Information and communication technologies
IP	Intellectual property
IPARD	Instrument for Pre-Accession Assistance - Rural Development
IPR	Intellectual property rights
ISPA	Instrument for Structural Policies for Pre-Accession
LAG	Local Action Group
LDC	Least-developed countries
LEADER	Liaison Entre Actions de Développement de l'Économie Rurale
LIFE	EU Funding Instrument for the Environment and Climate Action
LUCAS	EU Land Use and Land Cover survey
LULUCF	Land Use, Land-Use Change and Forestry
MESD	Ministry of Economy and Sustainable Development
MFN	Most-favoured nation
MZO	Ministry of Science and Education
NATO	North Atlantic Treaty Organization
N	Nitrogen
NAV	Non-ad valorem tariffs
NGA	Next Generation Agenda
NGO	Non-governmental organisation
NH3	Ammonia
NTM	Non-tariff measure
OHRRNM	Office for Human Rights and the Rights of National Minorities
OPG	Legal form of family farms in Croatia (*obiteljsko poljoprivredno gospodarstvo*)
P	Phosphorus
PHARE	Programme of Community Aid to the countries of Central and Eastern Europe
PO	Producer organisation
PSE	Producer Support Estimate
RASFF	Rapid Alert System for Food and Feed
RBC	Responsible Business Conduct
RDP	Rural Development Programme

RIA	Regulatory Impact Assessment
RRF	EU Recovery and Resilience Facility
RRP	Croatian Recovery and Resilience Plan
SAPARD	Special Accession Programme for Rural Development
SDG	Sustainable Development Goals
SEASN	Southeast European Network of Advisory Services
SFS	EU Small Farmers Scheme
SME	Small and Medium Enterprise
SMR	Statutory Management Requirement
SPS	Sanitary and phytosanitary measures
SSG	Special agricultural safeguard
SWOT	Strengths, Weaknesses, Opportunities, and Threats
TBT	Technical barriers to trade
TFP	Total Factor Productivity
TIC	Thematic innovation councils
TRIPS	Trade-Related Aspects of Intellectual Property Rights
TRQ	Tariff rate quota
UAA	Utilised agricultural area
UN	United Nations
UNFSS	UN Food Systems Summit
UPOV	International Union for the Protection of New Varieties of Plants
USD	US Dollar
VAT	Value added tax
VCS	EU voluntary coupled support
VHCN	Very high-capacity networks
VIP	Croatia's Agriculture Research Council
WTO	World Trade Organization
YFP	EU Young Farmer Payment

Executive Summary

Key messages

- Croatia's agricultural policies and objectives have evolved significantly over the past decades, with important reforms undertaken pursuant to its membership in the European Union and the World Trade Organisation. At present, EU policies, plans and strategies provide the main policy context and orientation for Croatian agriculture.
- Croatia's national vision for the sector emphasises productivity and competitiveness, promoting environmental sustainability and resilience, encouraging innovation, and improving rural areas. These objectives were also highlighted by OECD Ministers of Agriculture in their 2022 Declaration on Transformative Solutions for Sustainable Agriculture and Food Systems.
- Accession to the OECD can help Croatia improve the effectiveness of its agricultural policies with a view to developing stronger and more integrated food systems, strengthening the enabling environment for sector growth, promoting environmental sustainability and resilience, and making innovation work better for the sector.
- This report provides a series of recommendations to improve the productivity, sustainability, and resilience of Croatia's agriculture. Recommendations include: reforming agricultural support policies to orient them towards stated priorities on productivity; increasing inter-institutional co-ordination and stakeholder involvement in policymaking; exploring improvements to policies for food systems; creating opportunities for farmers including through taking advantage of all state-owned land; monitoring agri-environmental impacts and reducing environmentally harmful measures; strengthening climate adaptation and risk management; developing an agricultural innovation strategy; and investing in skills and in farmers' innovation capacity.

Croatia's policy and legal framework for agriculture has evolved significantly over three decades. Accession to the World Trade Organization (WTO) and to the European Union (EU) drove important reforms: the introduction of new models of agricultural support decoupled from production; the phasing out of measures with more distortive impacts; and the broadening of the vision for agricultural policy to include the rural development dimension. The agri-environmental policy and legal framework has also evolved to include a more comprehensive consideration of environmental impacts and climate protection, in line with EU priorities. Croatia adhered to the OECD-FAO Guidance for Responsible Agricultural Supply Chains in 2019 and established a National Contact Point (NCP) for Responsible Business Conduct, through which it has conducted awareness raising activities. While not a signatory of the 2016 Declaration on Better Policies to Achieve a Productive, Sustainable and Resilient Global Food System, Croatia has indicated that the goals of the Declaration are an integral part of its national legislation governing the sector. Croatia signed

the 2022 OECD Declaration on Transformative Solutions for Sustainable Agriculture and Food Systems, which reiterates the commitments of the 2016 Declaration.

Croatia has developed strategies in consultation with stakeholders that set out key objectives for the agricultural sector. Croatia's national Agriculture Strategy until 2030 and Common Agricultural Policy (CAP) Strategic Plan for 2023-27 seek to address economic, social and environmental issues, foster innovation in the sector, and promote a better life in rural areas. These strategies benefitted from broad consultation with sector stakeholders, which helped to identify and prioritise the country's needs and to direct policy interventions towards addressing them.

Croatia is also active in addressing several of the wider challenges in food systems. It has, for example, implemented policies in areas related to the functioning of the agro-food value chain, the prevention and management of food waste, and the promotion of healthy diets.

Policies in Croatia could benefit from the experience of OECD Members in better targeting the sector's priorities. Its current approach could benefit from more inter-institutional co-ordination for more effective interventions in specific policy areas and a more holistic consideration of the food system. While there is good stakeholder engagement in the development of national regulations, this could be strengthened in the context of Croatia's participation in the regulatory process at the EU level. There is also scope for further efforts to optimise support policies to help farmers, to improve both the situation in rural areas and the business environment, and to create more opportunities for producers.

The agro-food sector is performing relatively well, having undergone major structural transformation, although some challenges remain

Recent trends in the sector are encouraging. Agriculture is still undergoing a structural transformation; farm economic output and income have increased significantly, even if they remain below the EU average. The number and share of holdings managed by young farmers have increased in the last decade, a development at least partially driven by policies that encourage their participation in this sector. There has been a promising increase in farm ownership by women, although the share of female farm managers is still relatively low. Agriculture and food from Croatia have also increased their participation in global value chains over the last decade. Exports have accelerated over the last three years, although the sector continues to be characterised by a persistent and growing trade deficit.

Improving the enabling environment will require maximising the use of existing policy levers. A large area of unallocated state-owned agricultural land represents a significant untapped potential for further developing agricultural production, increasing efficiency and economies of scale, and attracting farmers with new skills by providing greater access to land and finance. Croatia could also devote an increasing share of CAP funding to innovation, productivity and rural infrastructure, and reform national level policies that are potentially production- and market-distorting. Croatia could also consider ways to make better use of the room for manoeuvre in the CAP and is invited to take account of relevant recommendations in the OECD review of policies for farming and food in the European Union. Encouraging more farmers to join forces via associations or co-operatives could strengthen their market opportunities and contribute to better functioning value chains. A well-articulated vision to promote exports and market diversification, targeted to the sector's specificities, could create opportunities for farmers and help achieve the key objective of increasing market diversification for Croatia's agriculture and food.

Croatia has the potential to achieve sustainable agricultural productivity growth. Productivity is high and output has increased without an associated increase in greenhouse gas (GHG) emissions. The sector is well below the emission reduction objective set for 2030, and Croatia has performed better than the EU and OECD averages in reducing the emissions-intensity of production. While forests have an important role to play in supporting Croatia's mitigation efforts, the carbon sink from land use, land-use change and

forestry (LULUCF) has declined over the past decades, as more forest has been put into production. Meeting the objectives of increasing Croatia's carbon sink would require a revision of logging plans. At the same time, the EU Renewable Energy Directive incentivises the use of solid biomass for bioenergy. More detailed forest management plans are necessary to ensure a path for achieving the multiple objectives for the sector.

Environmental pressures from agriculture are relatively low in a country that benefits from rich natural resources. Croatia has some of the richest ecosystems in Europe and abundant water resources, as well as a high share of protected terrestrial areas. Groundwater reserves remain of good quality and sales of pesticides have seen a strong decline over the past decade. Nonetheless, some areas deserve attention, such as surface water quality and ammonia emissions, which are affected by pressures from agricultural production. Nutrient surpluses are also above average. Data for some agri-environmental trends is limited, however; better data could help improve the monitoring and assessment of performance and policy impacts.

The agricultural knowledge and innovation system requires a more focused vision and stronger linkages. Croatia is developing its agricultural knowledge and innovation system (AKIS), which has strong foundations but would benefit from stronger linkages among actors and a higher involvement of the private sector. Encouraging innovation requires overcoming important structural challenges, such as a lack of critical mass and economies of scale resulting from the relatively small size of Croatia's agro-food sector. A sector-specific strategy for innovation would improve the identification of priorities and the design of measures that make better use of the available policy instruments, in particular through European networks.

Summary of recommendations

Area	Assessment	Recommendations
More effective policies for supporting the sector and making policies for food systems	The National Agriculture Strategy until 2030 and the Common Agricultural Policy (CAP) Strategic Plan for 2023-27 seek to address economic, social and environmental issues, foster innovation, and promote rural development. Many recent policy choices follow the pattern of the past. There is scope to better use support policies to enhance productivity and improve the rural situation. Increased policy scope and complexity require strengthened intra-governmental and stakeholder co-ordination. Domestic food markets functioning well, with moderate to low market concentration. Market regulation and competition in the sector are in line with EU regulation. Policies in place to encourage healthy food choices, but overweight and obesity rates are above average and increasing. Limited capacity to treat food waste, which contributes to relatively high levels of GHG emissions from waste. Further action could be taken to promote use of the OECD-FAO Guidance for Responsible Agricultural Supply Chains.	Strengthen the use of rural development support. Investigate and remedy reasons for the low uptake of rural development measures. Rethink national policy choices that result in high levels of support coupled to production. Promote inter-institutional co-ordination for a holistic food system approach. Strengthen stakeholder engagement in EU regulatory processes. Explore further actions to encourage healthier food choices. Improve the management of food waste. Strengthen efforts to promote the implementation of the OECD-FAO Guidance for Responsible Agricultural Supply Chains.

Area	Assessment	Recommendations
Promoting the enabling environment for agro-food sector growth	There is untapped potential in unallocated state-owned agricultural land. More young farmers and women are entering the sector despite structural constraints. Low level of farmer organisation. Agriculture and food increasingly integrated into global value chains. Their share in total exports has increased. Increasing market diversification is a key priority, but there is no sector-specific export strategy.	Assess the status of land ownership, the use of state-owned land, and the procedures for farmers to access it. Develop a plan to use state-owned land for land consolidation and structural transformation. Encourage the participation of women in farming. Explore innovative ways to encourage the organisation of farmers. Improve the sector's export orientation and market diversification.
A sustainable and resilient agro-food sector and effective climate action	There is a comprehensive agri-environmental policy and legal framework. The sector has the potential to achieve sustainable productivity growth, with low agricultural GHG emissions. It has already met its 2030 GHG reduction objective. Relatively low environmental pressures from agriculture. Some areas (e.g. nutrient balances, water quality, ammonia emissions) require attention and data. That said, the sector's energy consumption has increased in recent years. High reliance on fossil fuels. Subsidy on diesel for agricultural use. More detailed forest management plans are necessary to ensure a path for achieving the multiple objectives for the sector. The national climate change adaptation strategy includes measures for agriculture and forestry. There is potential to enhance adaptation and improve risk management and resilience.	Improve data collection and assessment of agri-environmental impacts. Reform the fossil fuel subsidy for agriculture. Develop a comprehensive forestry management strategy. Prioritise climate adaptation in strategic planning and monitor progress. Build the risk management capacity of farmers.
Strengthen the agricultural knowledge and innovation system	Innovation performance is improving but is still relatively low. A more strategic vision of innovation for the sector is needed. Strong agriculture research community, but the linkages amongst actors could be stronger. Public agricultural advisory services are well-established but face resource constraints. Farmers have low levels of training.	Develop a long-term innovation strategy for the agro-food sector. Promote greater engagement by the private sector in innovation processes. Address the capacity constraints confronting advisory services and provide a stable institutional framework for public and private extension services. Invest in an education and skills strategy for the sector.

Assessment and recommendations

Assessment

Croatia's economic and social progress has been remarkable, although challenges remain

Over the course of three decades, Croatia has leapt from a war-damaged centrally planned economy to a high-income and very high human development country. It is a member of the European Union (EU) and it is well-integrated in the global economy. Accession to the European Union in 2013 promoted socio-economic development and helped to strengthen institutions and policies, and to build domestic capacities. Croatia's 2023 entry into the Eurozone and the Schengen area is a recent milestone attesting to this progress and a further step towards economic convergence. Croatia has successfully recovered from recessions in the 2010s and during the COVID-19 crisis. Progress in employment, poverty reduction, environmental quality, public service availability, and laws and regulations have seen Croatia achieve similar levels as many OECD Members.

Important challenges remain nonetheless. In particular, the population decline driven by emigration has created a gap in the labour market, with a pronounced urban-rural divide across many dimensions, including income, employment, poverty, and access to public services. The disadvantages prevalent in rural areas motivate emigration to cities and abroad, triggering a cycle of depopulation and land abandonment that further aggravates its socioeconomic situation and undermines the maintenance of valuable ecosystems.

While agriculture and food policies are driven by the European Union, the Croatian government is responsible for strategic planning and implementation

Most policies and regulations that affect the agro-food sector – in particular the EU's Common Agricultural Policy (CAP) – in Croatia are decided at the European level and implemented at the national level. The new delivery model of the current CAP gives increasing responsibility to Member States on strategic prioritisation and policy choices. This is reflected in Croatia's 2023-27 CAP Strategic Plan and the national Agricultural Strategy until 2030.

The OECD recently reviewed policies for farming and food in the European Union and made 15 high-level recommendations concerning payments, regulations, innovation, data strategies, and environmental services (OECD, 2023[1]).

Croatia has the potential to achieve sustainable agricultural productivity growth even as further structural transformation continues

Agricultural productivity growth is relatively high and output has increased without an increase in GHG emissions

Despite the challenges, Croatia is on a solid path towards achieving sustainable agricultural productivity growth decoupled from greenhouse gas (GHG) emissions. After several years of low or moderate growth, agricultural production has recently increased, supported by improved yields. Productivity has been the primary driver of output growth: despite a deceleration with respect to the previous decade, in 2011-21 the average annual total factor productivity (TFP) growth of 2.4% was more than twice the average of the OECD (0.85%) and higher than the EU average of 1.2%.

Productivity gains in the sector have helped increase output without an associated increase in GHG emissions. Emissions from agriculture have followed a declining trend over the last three decades. While the reduction in emissions decelerated in 2011-21, Croatia still performed better than the EU and OECD averages in terms of reductions in emissions intensity thanks to higher productivity increases. Other agri-environmental trends show a mixed picture, however, with lower-than-average pesticide sales but above average use of synthetic nitrogen and phosphorus fertilisers, and a recent increase in ammonia emissions.

The sector is undergoing intensive structural transformation, with farmer income yet to converge with the EU average

Since the breakup of Yugoslavia and the war for independence, Croatia's agriculture has been subject to an intense process of structural adjustment. The transition from socialism involved changes in land ownership, the phasing out of subsidies on fertiliser use, the abolition of numerous forms of state intervention in agriculture and food markets, and a significant decrease in the size of the livestock herd.

The Croatian agricultural sector is still undergoing a structural transformation, with important declines in its share of GDP and employment. This process is reflected in the declining number of farm holdings and the increase in the average farm size from 5.8 to 8.6 hectares between 2010 and 2020. That said, the average farm size in Croatia remains almost half the EU average, and average farm economic output in 2020 was the second lowest in the European Union. While farm income has improved since Croatia's accession to the European Union in 2013, it remains well below the EU average.

Small family farms continue to be the backbone of Croatia's rural areas: 97% of all registered farms are family-run. As in other countries, farm structure is characterised by extremes: over 70% of farms have less than 5 hectares and account for only 15% of the country's agricultural area.

Despite structural barriers, more young farmers and women are entering the sector

In contrast to many EU countries, young people are increasingly entering the sector in Croatia. Over the last decade, both the number of holdings managed by young farmers and their share in all farm holdings have increased, despite the level of emigration and the negative demographic trend. This increase is expected to improve the economic performance of the sector because younger managers have a higher level of professional training, and their holdings are more competitive and efficient. That said, farmers continue to face constraints in access to finance and land ownership.

The share of female farm managers is still relatively low: women make up less than 30% of farm holders, even if they represent more than half of the farm family workforce. Recent data point to promising increases in farm ownership by women and in the average area of agricultural land held by female farmers. These developments may improve the gender balance and the situation of rural women, still marked by traditional gender roles and regional disparities in access to services.

Organic farming has expanded rapidly, driven by supportive EU policies

The area devoted to organic farming quadrupled between 2011 and 2022, and its share of the utilised agricultural area grew from 2% to 9%. The number of organic producers and processors and the size of the domestic market also increased, including in small segments such as aromatic and medicinal herbs, potential niche markets for Croatia.

The development of organic agriculture has been driven by supportive policies and significant CAP funding, and responds to European and national objectives and priorities. The impact of the expansion of organic agriculture on Croatia's agri-environmental performance warrants monitoring and evaluation. At the same time, the data suggests that the addition of new areas converted to organic agriculture has slowed following a peak in 2016.

The sector is increasingly integrated into global value chains through the European Union

Croatia's participation in global value chains in the agriculture and food sector intensified between 2000 and 2020. The importance of the sector in the country's total exports has increased, although not sufficiently to prevent a further increase in the trade deficit that has characterised the sector for decades. Croatia's export profile has evolved towards increased specialisation in cereals and oilseeds, with other export products losing importance, particularly following the collapse of the domestic sugar sector following the 2017 abolition of the EU sugar quota. Agriculture and food trade with other EU Member States expanded considerably after EU accession, becoming more dynamic alongside a widening gap with extra-EU trade, which since 2013 has reduced its share in total trade.

The policy and regulatory environment could be more conducive to sector growth

Policies and regulations have increased in scope and complexity…

Croatia's post-independence path of integration into the multilateral trading system and strengthened ties with the European Union drove a rapid evolution in its policy and legal framework, with important implications for the sector. The phasing out of guaranteed prices and input subsidies was required for accession to the World Trade Organization (WTO), while new models of producer support were required for alignment with the EU CAP. Preparations for accession to the European Union also widened the policy vision for the sector, driving Croatia to include a rural development dimension. Together with other international environmental and climate protection commitments, EU accession prompted an expansion of the agri-environmental policy and legal framework. Croatia has made significant progress in strengthening its regulatory policy framework and promoting a whole-of-government approach for regulatory quality.

… requiring stronger inter-institutional co-ordination

The larger scope and complexity of policies responding to the food systems' "triple challenge"[1] require greater co-ordination amongst the agencies responsible for policy design and implementation. Like most OECD Members, Croatia does not have a co-ordination body or mechanism to comprehensively cover food systems policies. Multiple arrangements regulate horizontal co-ordination for specific topics or policy areas.

Inter-institutional co-ordination is an area where Croatia could improve its performance. At present, the 2022 Sustainable Governance Indicators show a weak performance by Croatia in terms of the quality and frequency of inter-institutional co-ordination (Bertelsmann Stiftung, 2022[2]).

Notwithstanding the significant benefits of EU membership, the growing policy complexity is testing Croatia's administrative capacity

For the agro-food sector, EU membership has meant the opportunity of full integration into and access to the large EU Single Market; access to important sources of funding; higher environmental standards; and numerous opportunities for network-building and collaboration to promote innovation.

Croatia's top national priorities for the sector are of an economic nature: improving the sector's productivity, value-added and competitiveness; increasing farmers' incomes; and creating jobs. However, the priorities of the European Union focus on minimising the sector's environmental impacts. This mismatch is reflected in EU-funded projects under the European Innovation Partnership for Agricultural Productivity and Sustainability (EIP-AGRI), which often focus on promoting sustainable farming practices but rarely tackle the challenge of increasing productivity and adding value to production.

Croatia is a small player in EU agriculture: it represents less than 1% of EU agricultural output and value added and receives around 1% of CAP expenditures. While public servants are, on average, more highly educated than their private sector counterparts across Croatia's economy, skill shortages still constitute a barrier to delivering public goods and services or implementing reforms, and the public administration faces difficulties in retaining specialised staff (OECD, 2023[3]).

The growing number and complexity of EU regulations and requirements is stretching the capacity of Croatia's administration, however. Managing and controlling CAP expenditures demands an increasing number of staff at the Paying Agency in Agriculture, Fisheries and Rural Development (APPRRR). The public agricultural advisory service is also increasingly absorbed by administrative tasks. Demands from the requirements and rules of the EU and the CAP instruments take up an important share of its capacity, leaving limited scope for providing expert guidance to farms and bridging the gap between research and the adoption of innovation.

In the 2023-27 CAP, EU Member States have more flexibility in their national implementation of the common policy. Croatia opted not to use certain instruments for the redistribution of support to minimise the associated administrative costs. The OECD recently recommended that the European Union focus its environmental conditionality on fewer practices that are monitorable at a large scale so as to limit the administrative burden on Member States and farmers (OECD, 2023[1]).

There is space to better use support policies to enhance productivity and improve the situation of rural areas…

The CAP Strategic Plan (CSP) for 2023-27 under the new delivery model represents an opportunity for Croatia to prioritise needs in the agro-food sector. The sector will have access to EUR 3.7 billion of EU and national funds. Of this budget, direct payments and sectoral interventions (Pillar 1) receive 52% of the funds, and rural development measures (Pillar 2) receive 48%.

Despite the additional freedom provided to Member States, many of the policy choices Croatia made for the new CAP period follow the pattern of the previous period (2014-22) rather than changing in line with newly identified priorities, such as improving productivity. Rural development support focuses on investments to improve the sector's productive and processing capacity. However, a transfer of funds from the rural development Pillar 2 to direct payments under Pillar 1 will take place again for this programming period and Coupled Income Support (CIS) linked to production will be used up to the maximum share allowed. Some adjustments were made to improve the distribution of support and to better target small and middle-sized farms, in line with recommendations of a prior assessment of spending for the sector (World Bank, 2019[4]). Croatia continues to implement policies to attract young people to the sector through direct payments and rural development measures. In line with an increased ambition at the EU level, environmental and climate objectives are promoted via both pillars, which include eight new voluntary eco-schemes.

The Croatian Recovery and Resilience Plan (RRP) is an additional source of funding, with EUR 131.7 million of EU funds for financing investments in 2021-26 to improve the logistics infrastructure for the fruit and vegetable sector, to accelerate the restructuring and consolidation of agricultural land, to promote the digital transformation of agriculture, and to improve the food donation system.

Beyond the CAP, Croatia uses the space allowed by the EU legal framework to support the sector with national funds, in particular small-scale (*de minimis*) state aid for farming, which exempts payments below

EUR 25 000 per beneficiary for a three-year period from state aid notification under EU rules. This type of support is used to provide coupled payments in addition to, or for sectors not covered by, the European Union's Coupled Income Support Scheme: dairy cows, breeding sows, sugar beet, olive oil, and tobacco. Coupled support seeks to maintain production in these sectors, all of which are considered extremely sensitive. However, it might not create incentives for enhancing productivity and sustainability.

…and to allocate EU and national funding more in line with identified priorities

Given the priorities and needs identified at the national level, Croatia should make the most of the funding available to further develop the sector and promote its transformation. There is scope for Croatia to optimise the use of the funds as well as to use the available flexibility to target more support towards promoting productivity gains and innovation for sustainability and resilience. In particular, the relatively high share of support linked to production, including for emission-intensive sectors, deserves attention.

Rural development support has been found to have a higher impact than direct payments on Croatia's overall output, value added and job creation (World Bank, 2019[4]). However, the transfer of funds from this pillar to direct payments continued in 2023-27. In the 2014-22 CAP, the utilisation rates of measures to promote knowledge transfer and innovation and to support farmers' participation in organisations were very low. There is potential to continue improving the design of support policies to increase the uptake and adoption of these measures.

Strengthening producer organisation and promoting exports could create new opportunities...

The level of co-operation and organisation amongst Croatian farmers is low. There are few recognised producer organisations, and they contribute little to key sectors such as dairy and fruits and vegetables. Many farmers are reluctant to join co-operatives and other associations or groupings due to the negative connotations of such bodies from the Socialist era. In 2019, co-operatives covered only 0.2% of farmers.

Joining forces through associations or co-operatives, however, could help farmers profit from economies of scale for innovation and investment, strengthen their position in the market, and contribute to better functioning value chains. It could also help farmers access EU funds, as CAP sectoral interventions for the fruit and vegetable sector are channelled through recognised producer organisations.

The 2023-27 CSP includes EUR 5.3 million to support the establishment and operation of producer organisations, an amount slightly lower than in 2014-22, when only 20% of the budget for the rural development measure to support producer groups and organisations was spent. Given the small size and the fragmentation of Croatia's farming landscape, gaining critical mass is particularly important to improve small farms' linkages to markets. The low uptake of existing available support warrants further attention so as to improve policy design.

Croatia's agro-food exports mainly go to the EU market or to neighbouring countries. Increasing the market diversification for agricultural and food products is a key priority for the government, but there is no strategy for export promotion and export market diversification designed specifically for the sector. Public institutions and private sector organisations perform a range of export promotion activities, such as providing information and advice to potential exporters and promoting the participation of Croatian companies in international events.

Efforts on export diversification could be combined with attracting foreign investment in the agro-food sector, building on OECD recommendations for the implementation of a supply chain development programme, and an investment prioritisation framework for the Croatian economy (OECD, 2023[5]).

…as could improving the legal and institutional environment, including by increasing the involvement of farmers in regulatory processes

Laws and regulations related to the sector – e.g. the Agricultural Land Act – have been subject to numerous amendments. In addition, many relevant institutions have been reorganised, with significant shifts in

responsibilities over the last decades. For example, the agricultural advisory service was transferred to the Croatian Chamber of Agriculture in 2010, reinstated as an independent agency in 2012, and absorbed by the Ministry of Agriculture in 2019.

Frequent changes to the legal and institutional framework may result in a lack of predictability for producers. Reducing the complexity of the legal framework and the frequency of amendments would make Croatia's legal system more efficient and transparent. This could help improve the business environment for farmers, particularly for the numerous smallholdings and family farms.

Thanks to its advanced framework for public consultations, Croatia performs relatively well regarding stakeholder engagement in developing laws and regulations. The recent processes for Croatia's national 2023-27 CAP Strategic Plan and Agricultural Strategy up to 2030 included stakeholder consultation and engagement. That said, stakeholder engagement for proposed EU regulations is more limited: unlike other EU Member States, Croatia does not systematically inform its stakeholders about consultations at the EU level, nor does it conduct consultations to define its negotiating position.

The disposal of state-owned land remains a missed opportunity for land consolidation and attracting new talent to farming

Addressing the high fragmentation of privately-owned agricultural plots is an ongoing and unfinished task in Croatia. Past efforts helped to improve the registration of plots and the accuracy of land registry records, but the results in terms of actual land consolidation were modest. Croatia recently stepped up efforts in this area: as part of the reforms promoted by the Recovery and Resilience Plan, Croatia approved a legal reform setting the terms and rules for consolidation processes, and launched projects to consolidate at least 18 000 hectares of agricultural land.

An estimated one-third of agricultural land in Croatia is state-owned, and most commonly managed through the conclusion of lease contracts with farmers. Local governments provide maintenance for land that has not been disposed of as the law requires that such land be kept suitable for agricultural production.

Croatia has an untapped potential of almost 300 000 hectares of agricultural land that the private sector could use to further develop agricultural production and increase efficiency and economies of scale. Selling or leasing this land would bring revenue to the state, regional and local governments, and offer a pathway to land ownership for many farmers. This represents an opportunity for farm consolidation and to attract skills and talent to the sector through the more stable and predictable business models enabled by land ownership, as well as access to key sources of funding, including CAP payments and private finance.

The Agricultural Land Act, which regulates the disposal of state-owned land, has been amended numerous times. The most recent reform in 2022 seeks to accelerate the process of disposal with a scoring system that gives additional points to young farmers and women, organic producers, and members of producer organisations. The system also favours dairy and other livestock activities. However, lease agreements concluded between 2018 and 2022 covered only 3.7% of the land available for disposal, which suggests that administrative bottlenecks remain.

Croatia is tackling some challenges in food systems with well-functioning markets, but waste treatment capacity remains limited and performance on nutrition choices is weak

Domestic food markets are functioning well. Market concentration is moderate to low across the value chain. Market regulation and competition in the sector are in line with EU regulations. The OECD Product Market Regulation Indicators show that Croatia's overall product market regulation is in line with most OECD Members in terms of supporting competition. The promotion of Responsible Business Conduct (RBC) is underpinned by Croatia's 2019 adherence to the OECD-FAO Guidance for Responsible Agricultural Supply Chains. While Croatia has undertaken efforts to disseminate the Guidance among its stakeholders, further action is needed to promote its use by actors along the value chain.

There has been significant progress in measuring and preventing food waste, and complying with EU standards for reporting and measurement. Recent developments include an improved framework for food donations and the creation of county-level food banks. However, capacity to treat food waste remains limited and this contributes to the relatively high levels of GHG emissions from the waste sector.

Croatia has developed a mix of policies to encourage healthy food choices. This includes demand-side interventions, voluntary collaborations with the food industry (such as a front-of-pack nutritional label), regulations, and fiscal measures. Yet overweight and obesity rates are above the EU average and increasing at a faster pace, and fruit and vegetable consumption is declining in adults aged 15-34. These trends suggest there is space to explore further policy actions to promote healthier food consumption.

Environmental conditions are relatively good, but further action is needed to maintain the sustainability and climate resilience of agriculture

Environmental pressures from agriculture are relatively low, but some areas require attention

Croatia is endowed with some of the richest ecosystems in Europe and abundant water resources. It has taken action to mitigate environmental pressures by designating 38% of its territory as protected, well above the Kunming-Montreal target of 30% by 2030. Groundwater reserves remain of good quality and pesticide sales per hectare are half that of the rest of the European Union. Decreases in livestock numbers and the abolition of input subsidies in the early 2000s have helped reduce nutrient surpluses from agriculture.

There are nevertheless specific challenges linked to pressures from agricultural production. The quality of surface water remains affected by agricultural activities due to relatively low nutrient use efficiency. While the lower application of synthetic fertilisers has helped reduce nitrogen and phosphorus imbalances, nutrient surpluses are still above the EU average. Ammonia emissions have recently increased and, on current trend, are not aligned with the 2030 national target. Biological and landscape diversity are also affected by habitat loss and fragmentation.

Effective monitoring of environmental impacts requires more and better data

In line with the higher environmental and climate ambition of the 2023-27 CAP, Croatia's CSP assigned substantial funding to environmental and climate objectives. This budget includes almost EUR 1 billion over five years for new voluntary eco-schemes and agri-environmental rural development measures. Within these measures, special emphasis is placed on promoting crop diversification and organic farming to mitigate and prevent environmental impacts.

Assessing agri-environmental trends and impacts is complicated by the lack of data across some environmental domains. This includes data on agricultural water use, data for biodiversity monitoring through the Farm Bird Index and the Forest Bird Index (available only since 2016), and data on the status of soils, which is dispersed and not systematically collected. Croatia recently began improved monitoring of agricultural soils as part of the Recovery and Resilience Plan, but the availability of data in other areas remains limited.

Agricultural GHG emissions are low, but effective climate action requires additional efforts

Agricultural GHG emissions have strongly declined since the early 1990s, a trend linked to the decrease in the size of the livestock herd. The sector is meeting the emission reduction objective for 2030 set under the European Union's Effort Sharing Regulation. Croatia also performed better than the EU and OECD averages in reducing emissions intensity (emissions per unit of output) between 1992 and 2021, notwithstanding a deceleration in emissions reduction over the last decade. While emissions from livestock – which accounts for 60% of agricultural GHG – are at a historical low, soil emissions have been increasing since 2014.

Despite its low direct emissions, the sector's energy consumption increased between 2015 and 2020, and petroleum products still represent 81% of the energy sources consumed by the sector, encouraged by a subsidy in the form of a tax exemption on diesel for agricultural use. As part of the 8th Environment Action Plan for the European Union, Member States report these subsidies with harmful environmental effects and Croatia is engaged with the European Union to adapt its national policy in line with this process.

Forests play an important role in supporting Croatia's mitigation efforts. However, the carbon sink from land use, land-use change and forestry (LULUCF) has declined over the past decades as more forest has been put into production. Meeting the objective for 2026-29 set in the EU LULUCF Directive for increasing Croatia's carbon sink would require a significant revision of logging plans, while the EU Renewable Energy Directive incentivises the use of solid biomass for bioenergy. More detailed forest management plans are necessary to ensure a path for achieving the multiple objectives for the sector.

There is potential to enhance adaptation and improve the sector's risk management and resilience

Both agriculture and forestry are highly exposed and vulnerable to climate change, notably through the increasing number and intensity of droughts. Croatia has defined a National Strategy for Adaptation to Climate Change by 2040 with specific measures for both sectors. Monitoring and measuring progress towards adaptation has proven challenging, however, due to the difficulty of establishing indicators of progress, although a first set of indicators for this purpose has now been defined.

Croatia developed a country-level approach to the prevention and management of disaster risks through the 2016 establishment of the Disaster Risk Reduction Platform and the 2022 adoption of the Disaster Risk Management Strategy until 2030. Policies for the sector focus on subsidies for agricultural insurance financed by CAP funds. Other risk management interventions in the 2023-27 CSP, including support for investment for risk prevention and for restoring agricultural potential damaged by natural disasters and catastrophic events, have more limited scope and less funding.

The authorities have identified agricultural risk management as an area where more progress is needed, including using risk management instruments more and more efficiently. This is particularly evident given the numerous instances in recent years where the government has granted crisis response aid to the sector, while farmers' uptake of insurance and investments in prevention remain relatively low.

More work is needed to build awareness by farmers about the instruments available and, beyond increasing the uptake of insurance, developing skills in holistic risk management, including investing in prevention. As severe weather events become more frequent and serious, policy should promote farmers' preparedness and adaptation, enhancing their role and responsibility in managing their risks and adapting to a changing climate.

Croatia is starting to build its agricultural knowledge and innovation system

A more strategic vision of innovation for the sector as part of the European AKIS is needed

Croatia's innovation performance is improving but is still relatively low and faces important urban-rural disparities. Encouraging innovation in the agro-food sector is an important strategic objective for the government but faces structural challenges, such as low levels of public and private investment in

agricultural research and development (R&D), a lack of critical mass due to the small size of the country, and an urban-rural gap in access to high-speed internet.

While the authorities recognise the importance of innovation to achieve their strategic goals for the sector, Croatia does not have a specific strategy for innovation in agro-food. Sector-specific policies to promote private research, development and innovation (R&D&I) activities are also limited. Providing strategic direction to find where research can support Croatia's comparative advantages, and granting incentives to stimulate applied research and boost adoption should be government priorities.

Being a member of the European Union offers an opportunity for Croatia to integrate into larger Agricultural Knowledge and Innovation System (AKIS) networks. Croatian stakeholders currently make limited use of the available EU funds, which underscores that the availability of financial support by itself is not sufficient. Additional efforts are needed to boost collaborative innovative processes of learning and adoption. More effective use of international partnerships and EU networks would enhance the benefits of Croatia's global engagement more broadly.

Croatia has a strong agriculture research community, but linkages among actors could be strengthened

Croatia has a rich and experienced research community, with strong scientific and academic institutions. However, they operate in a fragmented environment with uncoordinated connections within the AKIS. The Croatian AKIS is also largely driven by the public sector and there is untapped potential for increasing the private sector's role.

More co-operation between AKIS stakeholders and knowledge platforms is needed to connect research actors with farmers, advisors, and rural businesses. A key effort in this area has started with the creation of an AKIS Coordination Body, which will bring together stakeholders to strengthen the connection and integration amongst actors and ensure more efficient information and knowledge flows.

More effective advisory services could help innovation reach farmers

Croatia's public advisory service is well-established and accepted by farmers. However, it suffers from resource constraints, with too few advisors mostly occupied with fulfilling EU administrative requirements. This limits its capacity to effectively respond to farmers' innovation needs. The government recently began to involve certified private advisors in an effort to expand the range of services available to farmers, increase competition, and relieve the administrative burden on public advisors.

Croatian farmers – in particular older farmers – have, in general, low levels of education and training. Various ongoing initiatives seek to better align the education system with labour market needs for new entrants to the sector, often younger and with higher levels of professional training. Until these reforms have a real impact, vocational training and extension services must be strengthened so that existing farmers can acquire the basic capacities needed to adopt innovative practices and new technologies.

Policy recommendations

This *Review* proposes recommendations on how Croatia could improve its policies and practices in the sector and make better use of the flexibility available in the CAP to adjust its current national policies to its stated priorities to enhance productivity and economic development in rural areas. This *Review* does not evaluate the policy and regulatory frameworks established by the European Union. Key recommendations are set out below.

More effective policies for supporting the sector and making policies for food systems

Further orient agricultural support policies towards stated priorities on productivity

Strengthen the use of rural development support. Croatia should maintain the high percentage of support provided through Pillar 2 on rural development, focusing this expenditure on transformative investments that can have a broader impact beyond agriculture, including access to and use of digital technologies, and the generation and transmission of knowledge and skills. The percentage of funds transferred from the rural development budget to direct payments could thus be further reduced or reversed.

Investigate and remedy the reasons for the low uptake of rural development measures. Despite their potential, some rural development measures have not been well-perceived by end-users, which has resulted in low absorption rates. The experience gained in the first CAP implementation should be valuable in assessing and remedying the reasons for this low uptake.

Rethink national policy choices that result in high levels of support coupled to production. While a large share of the support provided to producers is decoupled, Croatia continues to provide the largest allowed share of support as payments linked to production, complementing CAP Coupled Income Support (CIS) with similar programmes financed from the State budget. These programmes seek to help sensitive sectors to survive, several of which (e.g. sugar beet) have been in decline for years for reasons external to Croatia. Croatia should consider eliminating this type of payment given their market distorting and potential detrimental environmental effects, and reorient this support to investment in knowledge, skills and transformations that lead to new market opportunities. Croatia could also consider how to make better use of the room to manoeuvre in the CAP and is invited to take account of the relevant recommendations in the OECD review of the European Union (OECD, 2023[1]).

Increase co-ordination and stakeholder involvement in policy design and implementation

Promote inter-institutional co-ordination for a holistic food system approach. A co-ordination body and information-sharing mechanisms can help identify synergies and trade-offs in policies related to the different aspects of the triple challenge and lead to more effective policymaking. They could also contribute to the development of a food systems vision that considers the interaction of agriculture and food with other key economic activities such as tourism.

Strengthen stakeholder engagement in EU regulatory processes. Croatia should continue promoting inclusive stakeholder involvement in the development of policies and regulations relevant for the sector. To promote stronger engagement of domestic stakeholders in the development of EU regulations, Croatia could consider conducting regulatory impact assessments and stakeholder consultations for major EU directives and regulations, and systematically informing stakeholders about consultations at the EU level.

Continue exploring improvements to policies for food systems

Explore further policy actions to encourage healthier food choices. Given the growing health risks, Croatia could consider additional measures to encourage healthier food choices and tackle overweight and obesity. There are opportunities to learn from the experience of OECD Members.

Improve the management of food waste. Improving the monitoring and measurement of food waste, in line with the National Plan for the Prevention and Reduction of Food Waste for 2023-28, would help to inform and underpin further efforts. Ensuring the separate collection of bio-waste and investing in sorting and treatment infrastructures would be important steps in waste management. This could be complemented by measures to encourage composting by households.

Strengthen efforts to promote the implementation of the OECD-FAO Guidance for Responsible Agricultural Supply Chains. In addition to awareness and dissemination efforts, Croatia could consider further actions to promote the use of the Guidance by stakeholders along the value chain. For example, other adherents promote the Guidance by referencing it in domestic regulation, incentivising its use in company management systems, or by conditioning participation in public procurement on its demonstrated implementation.

Promoting the enabling environment for agro-food sector growth

Take advantage of all state-owned land to create opportunities for new and existing farmers

Undertake an in-depth assessment of the status of land ownership, the use of state-owned land, and the procedures for farmers to access land. This assessment should identify the reasons for current bottlenecks in disposing of land and propose pragmatic solutions to make this land accessible to farmers.

Develop an ambitious plan to use state-owned land for land consolidation and structural transformation. Use the above assessment to identify and undertake the necessary reforms to address the current impasse in the conclusion of contracts, make access to land easier for farmers, and improve the avenues for farmers to own or lease land. Develop an ambitious plan to facilitate an agile and dynamic process of land consolidation and attract new farmers and new talents to rural areas.

Create more and better opportunities for farmers

Encourage women's participation in farming. In future CAP cycles, policies could also be oriented towards increasing female participation. For example, Spain's CSP increases the payment for young farmers if the beneficiary is female and owns or co-owns the farm, and women are prioritised in grants for investments in the processing, commercialisation, and development of agricultural products (OECD, 2023[6]).

Explore innovative ways to encourage co-operation amongst and organisation of farmers. The low uptake of previous measures to encourage the development of farmer organisations merits a deeper assessment of the causes and of possible avenues to improve their implementation. The government could also take action to improve awareness of the benefits of participating in associations and groupings, and to dispel misconceptions about co-operatives.

Improve the sector's export orientation and market diversification. Define an export promotion and export market diversification strategy for the sector that promotes the co-ordination of export promotion activities by different actors to exploit their synergies. Explore ways to foster the linkages of small and medium enterprises with exporting companies to develop deeper export supply chains. An example from an OECD Member is Costa Rica's DESCUBRE programme, which grants seed funding and technical assistance to help small producers become providers to larger exporting companies in selected agro-food value chains (OECD, 2023[7]).

A sustainable and resilient agro-food sector and effective climate action

Monitor agri-environmental impacts and reduce environmentally harmful measures to improve policy performance

Improve data collection and assessments of agri-environmental impacts. A valuable effort has begun to systematise the collection of data for soil monitoring. This could be extended to other environmental issues, such as ammonia emissions. Further investment is also required in using these data to monitor and analyse policy performance.

Develop a comprehensive forestry management strategy to ensure that the sector can effectively meet the potentially conflicting objectives of increasing its role as a carbon sink and enabling increased use of energy from biomass.

Reform the fossil fuel subsidy for agriculture. Adapt and prepare the sector for the progressive elimination of the subsidy to agricultural diesel, in line with the plans to remove fossil fuel subsidies spelt out in the updated Integrated National Energy and Climate Plan for 2021-30.

Strengthen climate adaptation and improve risk management to increase the sector's resilience

Prioritise climate adaptation in strategic planning and monitor progress based on the proposed group of indicators. As part of this effort, it will be important to enhance information and advice to farmers on the impacts of climate change in Croatia and promote a proactive adaptation of farming practices.

Develop the risk management capacity of farmers. This will require training and awareness-building to enhance their entrepreneurial skills to manage all kinds of risks and to take new opportunities, with an emphasis on prevention and preparedness.

Strengthen the agricultural knowledge and innovation system

Develop an ambitious agricultural innovation strategy in collaboration with the private sector

Develop a long-term innovation strategy for the agro-food sector that provides a vision and stability and which improves AKIS connectivity. An ambitious innovation strategy with strong links to European networks and tools will enable a better definition of priorities and use of available funds to leverage Croatia's comparative advantage and to promote knowledge and innovation that are necessary for improving the competitiveness of the sector. Strengthen the role of the co-ordination body to integrate public and private actors, and ensure more efficient information and knowledge flows among research, innovation developers, farmers, advisors, and private companies. Promote the use of international partnerships and EU networks to enhance the benefits of Croatia's global engagement.

Promote greater engagement by the private sector in innovation processes. Improve the targeting of policy instruments to the private agro-food sector and strengthen co-operation amongst private actors and between public and private AKIS stakeholders. Provide sufficient resources and incentives to stimulate applied research, and boost private investments on innovation development and adoption.

Invest in skills and in farmers' capacity to innovate

Address the capacity constraints confronting advisory services and provide a stable institutional framework for public and private extension services. Strengthen the role of the advisory service in facilitating knowledge flows, establishing a network of innovation brokers and ensuring that sufficient resources are available to engage with farmers frequently and locally. Enhance the involvement of private advisors to help fill gaps, including on administrative tasks, and relieve the bureaucratic burden of the public service to allow them to focus on innovation. Continue the effort to establish a back office with specialised advisors to provide expert support to AKIS stakeholders and train other advisors. Effectively

implement the bottom-up approach that is required to ensure higher relevance and efficiency of the Croatian AKIS.

Invest in an education and skills strategy for the sector. Reducing skills gaps, improving access to vocational education and boosting digitalisation should be priorities for the new AKIS co-ordination body. While waiting for new and upcoming reforms to better align the education system with labour market demands to take effect, enhance vocational training and extension to ensure that farmers today have the basic capacities to allow them to adopt innovative practices and new technologies, including digital technologies.

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Note

[1] The term “food systems” refers to all the elements and activities related to producing and consuming food, as well as their effects, including economic, health, and environmental outcomes. Food systems around the world face the “triple challenge” of simultaneously providing food security and nutrition to a growing global population, providing livelihoods to those along the food supply chain, and contributing to environmental sustainability (OECD, 2021[8]).

1 The agricultural policy context

Croatia has experienced a strong recovery after a long economic recession in the early 2010s and the disruptions from the COVID-19 pandemic. Nonetheless, it still faces challenges as it converges with the European Union. The agro-food sector represents a relatively small share of the economy and has undergone structural changes in the last decades. This chapter outlines the sector's context and characteristics, assessing the factors that enable or constrain its future productivity growth and development. It describes the general economic and policy context and the role of agriculture in the economy. It addresses key trends and structural changes and examines aspects related to gender balance and the role of migration and minorities. It also analyses trends in foreign trade and the sector's participation in global value chains.

Key messages

- Croatia's post-independence and post-war path of integration into the multilateral trading system and stronger ties with the European Union have shaped its economic and agricultural policy context.
- It has made significant economic and social progress since independence in 1991. However, it faces a population decline and a significant rural-urban gap.
- The economy is mainly services-based, with agriculture representing just 3% of GDP and 6% of employment. Despite a structural transformation evidenced by fewer farms and an increase in their average size, Croatian farms continue to be smaller than the EU average.
- Small, family-run farms remain the backbone of Croatia's rural areas. The farm structure is divided, with over 70% of small farms holding only 15% of agricultural land, and larger farms showing better economic outcomes.
- Emigration, particularly from rural areas, has intensified since EU accession. This has created a labour market gap that is increasingly filled by workers from non-EU countries. In 2022, immigration exceeded emigration flows for the first time in 15 years.
- Most farm managers are 55 years old or older, but a recent increase in the number of young farmers is a welcome development given Croatia's demographic challenge.
- Croatia's geography and climate favour diverse farming activities, with agriculture covering 27% of land area. About a third of agricultural land is state-owned and efforts are underway to increase land consolidation.
- The value of agricultural production is recovering after several years of decline. Crops, particularly cereals and oilseeds, make up almost two-thirds of the sector's production. Organic farming is gaining in importance.
- Croatia is a net agro-food importer, particularly of animal products and foodstuffs. Export patterns have changed in the last two decades: cereals and oilseeds gained in importance, while sugar declined. Intra-EU trade dominates and is more dynamic than trade with third countries. In general, the sector has deepened its integration in global value chains.

1.1. Context

The Republic of Croatia (hereafter "Croatia") declared its independence in 1991 and was admitted to membership in the United Nations in May 1992. It had previously been one of the constituent republics of the Socialist Federal Republic of Yugoslavia.[1]

Croatia's declaration of independence was followed by five years of armed conflict. After the war, the government set integration in the multilateral trading system and EU membership as strategic goals (Franić and Ljubaj, 2015[1]). This led to accession to the World Trade Organization (WTO) in 2000 and to the 2005 start of EU accession negotiations. Croatia joined the North Atlantic Treaty Organization (NATO) in 2009 and the European Union in 2013. In 2023, it joined Europe's Schengen area and adopted the euro.

With a land area of 55 960 km^2 and a population of 3.8 million, Croatia is among the ten smallest countries in the European Union (European Union, 2023[2]). Despite its size, the country is geographically diverse, with extensive plains to the east, mountainous areas in the centre, and a long Adriatic coastline with numerous islands. This geographic diversity has shaped the development of its agro-food sector.

1.1.1. General features of the Croatian economy

Croatia has made significant development progress in a challenging demographic context

Croatia has made significant economic and human development progress in the last decades. Since 1992, it advanced from the lower-middle income to the high-income category (World Bank, n.d.[3]). Its Human Development Index increased from High (0.712) to Very High (0.858) between 1995 and 2021 (United Nations Development Programme, 2022[4]). Between 2000 and 2021, Gross Domestic Product (GDP) measured in purchasing power parity terms increased from USD 48 billion to USD 135 billion, and GDP per capita more than tripled, albeit in a context of population shrinkage (Table 1.1).

Rapid population decline has affected Croatia's labour market and economy. The country has lost over 900 000 people in 30 years; in 2021, the census revealed a population below 4 million for the first time since the 1960s. This trend is expected to continue, with a projected population of 3.1 million and a shrinkage of the working-age population from 63% to 57% by 2060. A major driver has been emigration, which accelerated following accession to the European Union (OECD, 2025[5]). This trend is now contributing to labour shortages that have motivated increased inward migration flows (Section 1.4.3).

Croatia experienced economic recessions in the first half of the 2010s and during the COVID-19 crisis. More recently, the country has had a strong recovery, with output growth returning to the average rates of the late 2010s. Employment increased and poverty declined over the past decade, and improvements in environmental quality, public services, and laws and regulations make Croatia compare well with OECD countries on many dimensions (OECD, 2023[6]).

Table 1.1. Croatia's economic growth has happened in a challenging demographic context

Evolution of contextual indicators between 2000 and 2021

Contextual indicators		
	2000*	2021*
Economic context		
GDP (billion USD in PPPs)	48	135
Population (million)	4.5	4.0
Land area (thousand km2)	55.9	56.0
Agricultural area (AA) (thousand ha)	1 169.0	1 505.0
Population density (inhabitants/km2)	81	73
GDP per capita (USD in PPPs)	10 669.4	34 022.6
Characteristics of the agricultural sector		
Crop in total agricultural production (%)	53.5	60.6
Livestock in total agricultural production (%)	42.6	36.2
Share of arable land in AA (%)	72	59

Note: *Or closest available year.
Source: OECD statistical databases; UN Comtrade; World Bank, WDI and national data.

Services, particularly tourism, are key for the economy

Croatia has a service-based economy. Services contribute 64% of employment and their value added represents 61% of Croatia's GDP (World Bank, 2023[7]). Tourism is the most important service activity and a key sector of the economy. Prior to the COVID-19 pandemic, the direct contribution of tourism to GDP was estimated to be 11.8% and it provided 91 608 direct jobs or 6.8% of total employment. Following a two-year decline, preliminary data point to a full recovery of tourism activities in 2022 (OECD, 2022[8]). Croatian authorities highlight associated opportunities for the agro-food sector, particularly the potential for

developing more diversified activities such as rural tourism and for promoting high value-added agro-food products in tourism and hospitality (Ministry of Agriculture, 2022[9]).

1.1.2. Political and institutional features

Regional and local governments have many responsibilities, but their capacities differ

Croatia is a unitary republic subdivided into four regions, 21 counties (*županije*) and 555 local governments that include 428 municipalities and 127 towns (OECD/UCLG, 2022[10]). The regional and local governments have autonomy in decision making and management over a widely defined range of policies (OECD, 2023[11]). However, the assignment of responsibilities has been complex and asymmetric, with most responsibilities transferred to municipalities with the strongest fiscal capacity (OECD/UCLG, 2022[10]). The current distribution of responsibilities appears to create barriers to delivering public goods and services by subnational governments with differing financial resources and service quality (OECD, 2023[6]).

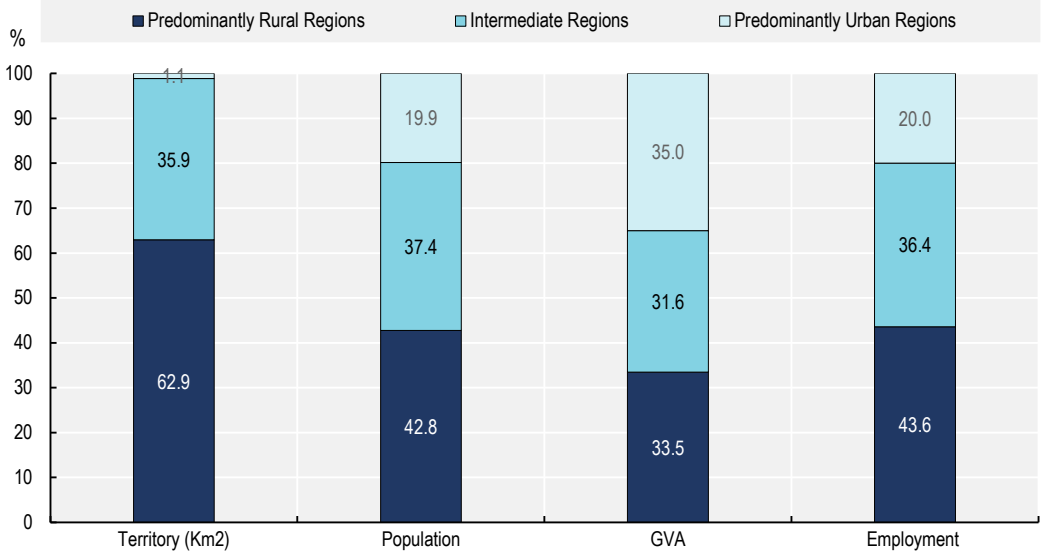
1.1.3. Demographic and social features

A pronounced urban-rural gap marks many socio-economic dimensions

Thirteen of Croatia's 21 counties have been classified as predominantly rural.[2] Predominantly rural areas[3] cover 63% of Croatia's territory and 43% of its population, generating 33% of the economy's gross value added (Figure 1.1), against averages of 45%, 21% and 16% respectively at the EU-27 level.

Figure 1.1. Over 40% of the population lives in rural areas

Distribution of territory, population, value added and employment by urban-rural typology



Source: Eurostat (2023), Labour market statistics by other typologies [URT_D3AREA, URT_PJANAGGR3, URT_10R_3GVA, URT_LFE3EMP], consulted October 2023.

Croatia has a pronounced urban-rural divide: as of 2020, the GDP per inhabitant in rural regions was EUR 9 600, less than half that of urban regions (Eurostat, 2023[12]). At 7.8% in 2021, the unemployment rate in rural areas is higher than in cities (6.7%) and above the EU rural unemployment rate of 5.9%

(Eurostat, 2022[13]). The share of the Croatian rural population at risk of poverty (25.3%) is also considerably higher than the rate in cities (13.6%) (Eurostat, 2022[14]).

The demographic trends of population ageing, low birth rates, and emigration particularly affect rural areas. These trends were observed in many Croatian villages in the mid-twentieth century and have worsened in recent decades (Nejašmić and Toskić, 2016[15]). Property abandonment in small towns and rural areas was also accelerated by the war in the 1990s (Lončar and Pavić, 2020[16]). Additional concerns relate to the low level of development of rural infrastructure.

1.2. The role of agriculture in the economy

Croatia is a small player in EU farming, with 0.6% of the European Union's agricultural output and 0.7% of the European Union's agriculture, fisheries and forestry value added. The sector's contribution to GDP and employment is also decreasing, in line with global trends and reflecting the country's economic development and integration into the European Union (World Bank, 2019[17]).

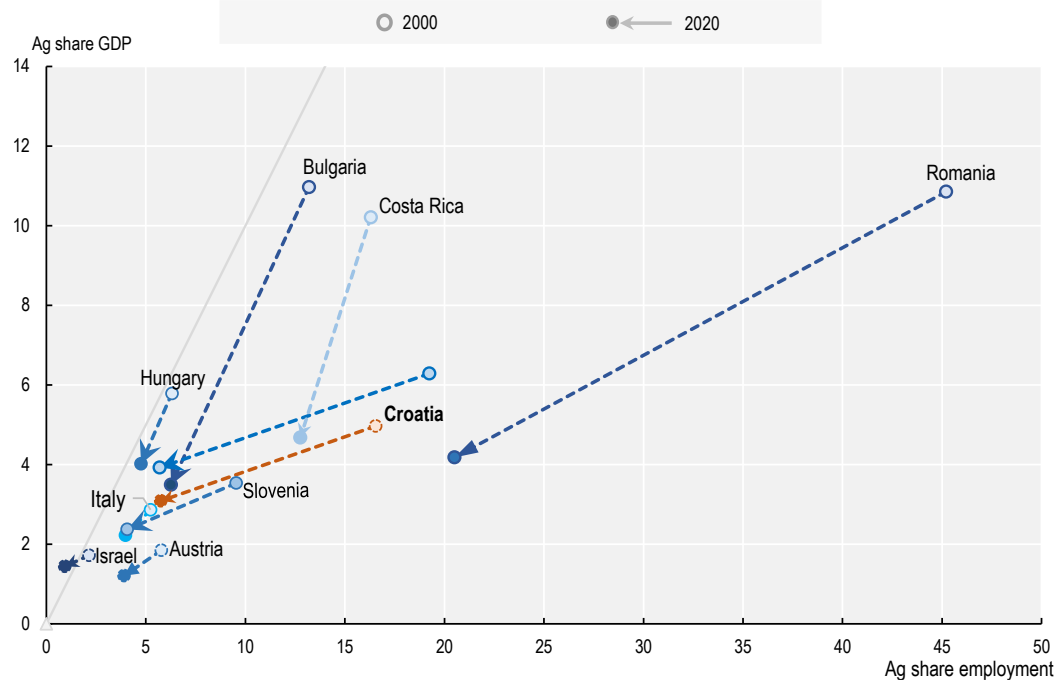
1.2.1. Agriculture in production and employment

The sector is undergoing a structural transformation that is not unique to Croatia

Between 2000 and 2020, the share of agriculture in Croatia's GDP decreased from 5% to 3%. The sector's contribution to employment experienced an even stronger decrease: in 2020 it represented 6%, almost a third of its share in 2000 (17%). This structural transformation occurs to a lesser or greater extent in Croatia's peer countries,[4] both inside and outside of the European Union (Figure 1.2).

Figure 1.2. The relative importance of agriculture has decreased

Evolution of shares of agriculture in GDP and employment



Source: World Bank (2022), World Development Indicators, Eurostat (2022) [LFSA_EGAN22D] & [NAMA_10_A10], OECD (2022), National Accounts of OECD Countries, Volume 2022 Issue 1, OECD Publishing, Paris, https://doi.org/10.1787/de01f0c1-en.

1.2.2. Farm size, labour and income

Most farms are family-run and their economic size is small

The majority of Croatian agricultural holdings are family farms[5] (Box 1.1). They made up 97% of the 144 000 holdings recorded in the 2020 Agricultural Census (Croatian Bureau of Statistics, 2021[18]). This puts Croatia in sixth place in the European Union in terms of the share of family farms, after Greece, Romania, Poland, Malta, and Italy. As in most EU Member States, family farms in Croatia are much smaller than non-family farms, with a mean size of 7 hectares against 63 hectares (Eurostat, 2023[19]).

The 2020 Agricultural Census reported a regular agricultural labour force of 331 473 persons, 92% of which were family labour (including farm holders and their family members). Over half (53%) of farms had only family workers, which puts Croatia in fourth place in the European Union in terms of the share of farms with exclusively family labour, after Romania, Poland, and Hungary.

There are large differences in the economic size of family and non-family farms. The former had an average economic output of EUR 9 775 in 2020, the second lowest in the European Union (after Romania). The average output of non-family farms was EUR 139 381, also the second lowest among EU Members but fourteen times that of family farms (Eurostat, 2023[19]).

Box 1.1. Legal forms of agricultural holdings

The Law on Agriculture defines "farmer" as a natural or legal person or group that performs an agricultural activity on Croatian territory. Agricultural activities may be performed under four main legal forms recorded in the Farm Register maintained by the Paying Agency for Agriculture, Fisheries and Rural Development (APPRRR). As of end-2022, it recorded 166 430 legal entities. Most were family farms (77%) and self-sufficient family farms (19%). There were 3 400 commercial companies (2%), 2 466 trades or crafts (1.6%), and 346 co-operatives (0.2%) (APPRRR, 2023[20]).

Family farms (OPG)

The Law on Family Agriculture declares family farming a strategically important organisational form of agriculture. A family farm, commonly known as OPG (*obiteljsko poljoprivredno gospodarstvo*), is defined as an economic entity of a natural person that independently and permanently carries out agriculture and related activities with own and/or hired production resources and the work, knowledge and skills of family members. The Law defines the conditions of the agricultural activity, covering aspects such as the work of family members and the obligation to keep records of both agriculture and supplementary activities (such as catering and tourism services). OPG holders are liable with all of their assets for the obligations arising in the performance of agriculture.

OPGs with an economic size of more than EUR 3 000 or that are liable for income or profit tax must be entered into the Family Farm Register, also managed by the Paying Agency. Entry into the Family Farm Register implies mandatory membership in the Croatian Chamber of Agriculture. Farms below the EUR 3 000 threshold are classified as self-sufficient agricultural holdings (SOPG), which produce mainly for their personal needs and need not be entered into the Family Farm Register.

Crafts

The Crafts Act states that any economic activity that is not prohibited by law can be performed as a craft business. A trade or craft business (*obrt*) is an economic activity performed independently by a natural person (Ministry of Economy and Sustainable Development, n.d.[21]). Owners are personally

liable for their business obligations. A craft performing agricultural activities must be entered in the Farm Register. Crafts must also register with the Croatian Chamber of Trades and Crafts.

Co-operatives

The Law on Cooperatives governs the establishment of these voluntary associations. An agricultural co-operative is a voluntary, open and independent association with at least seven members (natural or legal persons) that carries out crop production, animal husbandry, forestry, hunting, or related service activities.

Companies

Companies performing agricultural activities can take different legal forms. These are governed by the Company Law. The most common type is the private limited company (*društvo s ograničenom odgovornošću* or d.o.o.), which can be owned by one or more persons without limitation on the number of owners or board members. It has a minimum start-up capital requirement of EUR 2 650 (HRK 20 000). Other legal forms include the simple limited liability company (j.d.o.o.) with a minimum start-up capital of EUR 1 (HRK 10) and a maximum of five owners and one board member (Court Register of the Republic of Croatia, n.d.[22]), or the joint stock company (*dioničko društvo*, or d.d.). All companies must become members of the Croatian Chamber of Economy, but smaller companies are exempted from mandatory payment (HGK - Croatian Chamber of Commerce, 2023[23]).

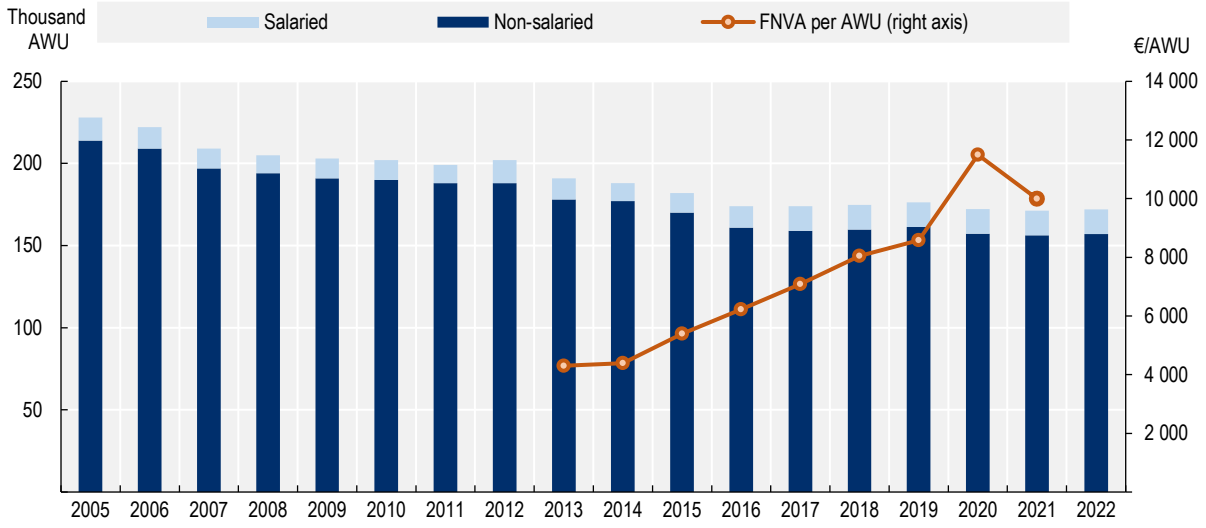
Farm income has increased following accession to the European Union, but is still below the EU average

Agricultural labour, measured in Annual Working Units (AWU),[6] decreased by 25% between 2005 and 2022 (Figure 1.3). The share of salaried labour experienced a slight increase from 6% in 2005 and has remained constant at 9% since 2017. The annual average farm income – defined by Eurostat as average farm net value added (FNVA) per AWU[7] – experienced a significant increase after Croatia's EU accession and up to 2020; however, in 2021 it declined to EUR 9 994, considerably below the EU average of EUR 28 786.

There are divergences in farm income depending on the activity of the farm, with the highest 2021 value (EUR 17 853) for horticulture. Income from field crops, wine, and grazing livestock farms was above the average of EUR 10 119, while mixed farms and farms with other permanent crops had the lowest incomes (below EUR 6 300) (FADN, 2023[24]).

Figure 1.3. Agricultural labour is decreasing, farm value added has increased since EU accession

Evolution of agricultural labour and income



Source: Eurostat (2023), Agricultural labour input statistics [AACT_ALI01], accessed July 2023; FADN (2023), (FNVA) Farm Net Value Added (EUR/AWU)], accessed August 2023.

1.2.3. Land use

Croatia's geography and climate support a diverse agricultural production

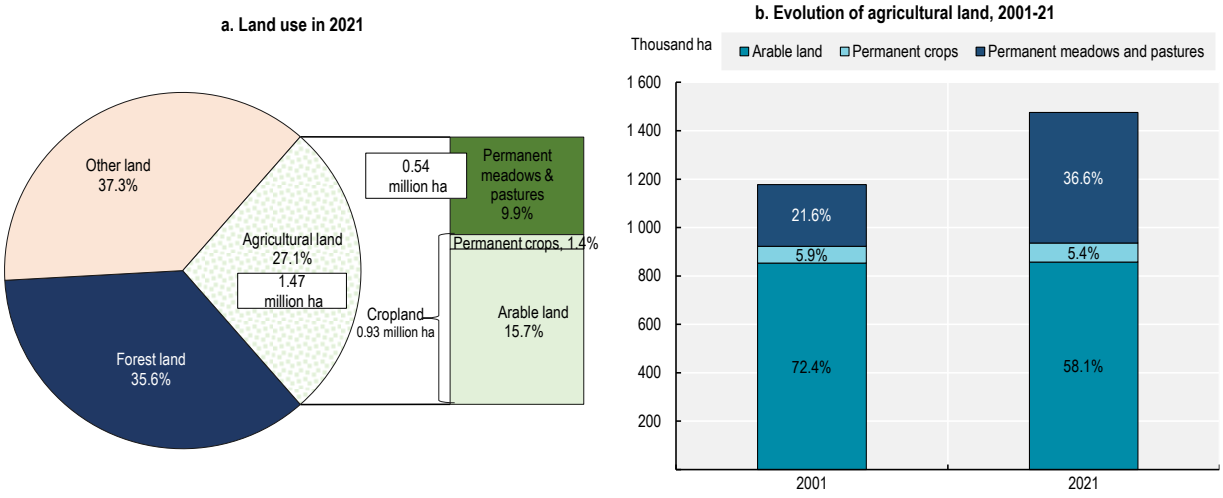
Agricultural land covers 27% of Croatia's land area. A further 36% is covered by forests (Box 1.2). As of 2021, Croatia's Utilised Agricultural Area (UAA) was approximately 1.5 million hectares. Land use statistics registered an increase in agricultural land over the last two decades, in particular of permanent meadows and pastures (Figure 1.4), in contrast with the EU-wide trend of a consistent reduction (OECD, 2023[25]). However, this may be explained by a change in the methodology to estimate this land area since 2013. The area of common land (under a tenure mode of shared farming) was recalculated with a new source of administrative data. This change resulted in an increase of the grassland area and of the total UAA, but data before 2013 could not be adjusted.[8]

BAŠIĆ et al. (2007[26]) divided Croatia's territory into three agricultural regions based on climactic conditions and land resource potential.

- The Pannonian region, located in the east, has good natural conditions for agricultural production. It is considered the "breadbasket" of the country, with production of arable and industrial crops, livestock, wine, fruits, and vegetables. This region was severely affected by the war, however, which damaged its production capacity.
- The mountainous region, in the centre, is rich in natural resources and has heterogeneous soil conditions. Agricultural production includes livestock and crops adapted to the climate, such as early types of corn, potatoes, rye and vegetables. Due to its high density of forests, wood processing is an important activity, as is tourism around the Plitvice Lakes National Park.
- The Adriatic region, along the coast, is characterised by a Mediterranean climate and by the production of citrus and other Mediterranean fruits, olives, wine, sheep, and goats.[9] This is a predominantly touristic region, with agricultural activities having a lower weight in the local economy. The central and southern part suffered in particular from the effects of the war.

Figure 1.4. Agricultural land covers less than one-third of Croatia's land area

Land use and evolution of agricultural land



Note: The significant increase in the area of permanent meadows and pastures is explained by methodological changes.
Source: FAOSTAT (2023), [Land use indicators], accessed July 2023.

Box 1.2. Forests and forestry

Croatia has a longstanding forestry and forest management sector

Croatia has an estimated 2.7 million hectares of forests and forest land (Croatian Forests, 2023[27]). Forest and other wooded areas[1] covered around 48% of the territory in 2018, according to the EU Land Use and Cover Area (LUCAS) survey (see also Section 3.6). Seventy-six per cent of this forest land is state-owned, most of it managed by the state-owned company Croatian Forests (*Hrvatske šume*). The remaining area (about 661 000 hectares) is privately owned. Private forests are characterised by a large number of properties with a size smaller than 1 hectare (Croatian Forest Research Institute, 2015[28]).

Forestry and forest management have a long tradition in Croatia. The first forest mapping and Forest Law date back to the 18th century (Anic, Mestrovic and Matic, 2012[29]). Today, the country places emphasis on sustainable management and protection: almost half of the forest area is in the Natura 2000 network of European protected areas and all state-owned forests are certified by the Forest Stewardship Council (FSC).[2]

The current Forest Law defines three types of forest: economic (or productive), protective, and special purpose forests. Economic forests cover 52% of Croatia's land area and are used to produce forest products. Protective forests cover 30% and have the purpose of protecting resources such as land (e.g. areas at risk of erosion), water or biological diversity. The remaining 18% are forests with a special purpose, such as protected areas or scientific research (FSC Adria-Balkan Region, n.d.[30])

Production of wood and other forestry products

The estimated wood stock in Croatia is 418.6 million cubic metres (m^3): 315.8 million m^3 is in state-owned forests managed by Croatian Forests; 83.7 million m^3 in privately-owned forests; and 19.1 million m^3 in state forests used by other legal entities (FSC Adria-Balkan Region, n.d.[30]). In 2022, 6.1 million m^3 of gross wood were obtained from the forests managed by Croatian Forests, generating

a revenue of about EUR 340 million (Croatian Forests, 2023[31]). The private sector points out recent positive trends in the wood processing industry, reflected in an increase in production and exports (Croatian Chamber of Economy, 2023[32]). Other products from forests include forest fruit, mushrooms, herbs, resin, and humus (Croatian Forests, 2021[33]). As of 2016, Croatia was one of the five countries in Europe with the highest share of forest sector workers relative to the total workforce, along with Latvia, Estonia, Bulgaria and Lithuania (UNECE, 2019[34]).

Forest management challenges

The presence of landmines from the armed conflict of the 1990s poses an important challenge to forest management and conservation. Forests constitute almost 98% of Croatia's mine-suspected area, which is estimated at 233.9 km^2 as of January 2022 and is distributed over seven counties. Demining efforts are expected to continue in the coming years, with the goal of removing mine hazards from the entire country by 2026 (Croatian Parliament, 2023[35]).

Other challenges relate to the management of the privately-owned forest area, which is characterised by its fragmentation and dispersion (Bakarić et al., 2021[36]). There is often unclear ownership, lack of forest management plans and illegal logging (Croatian Forest Research Institute, 2015[28]). Private forest owners also indicate that restrictive regulations and administrative obstacles prevent them from taking advantage of the economic potential of their forests (Croatian Federation of Associations of Private Forest Owners, n.d.[37]).

1. The FAO defines "forest" as the land spanning more than 0.5 hectares with trees higher than 5 meters and a canopy cover of more than 10%, or trees able to reach these thresholds in situ. "Other wooded land" is defined as land not classified as "forest", spanning more than 0.5 hectares; with trees higher than 5 meters and a canopy cover of 5-10% (FAO, 2018[299]).
2. The Forest Stewardship Council (FSC) certification is a voluntary certification system for verifying responsible management practices.

1.2.4. Land ownership

About one-third of agricultural land is state owned, and plots under private ownership are very fragmented

Approximately one-third of agricultural land in Croatia is publicly owned. However, the exact size and share of public agricultural land are unclear due to a lack of unambiguous data from a single source (Mičević, 2016[38]). Estimates for 2013-18 indicated that 33% of all agricultural land was state-owned (Vranken et al., 2021[39]).

This pattern of land ownership has its roots in the previous socialist system. Unlike other socialist countries, Yugoslavia never fully collectivised agriculture, and by the 1980s private producers were farming about three-quarters of the arable land. There was a sharp distinction between socialised enterprises, which practised large-scale agriculture and had processing facilities, and private peasant holdings, which were mostly farmed with primitive means and subject to a constitutional limit of 10 hectares per holding (OECD, 1973[40]). Large socially-owned enterprises (*agro-kombinats*) were often horizontally and vertically integrated (ARCOTRASS Consortium, 2006[41]), and the registration of their land in the cadastre was often neglected (Obradović, 2016[42]). Following independence, the land under social ownership fell under state ownership, with its disposal governed by the Agricultural Land Act (Josipović, 2021[43]).

The disposal of privately-owned land is subject to general property law, and private owners can freely sell and lease their agricultural land with some restrictions applicable to the acquisition by foreigners (Section 2.4.5). The high fragmentation of plots of privately-owned land is an issue, as is the ownership by persons who cannot be reached or have an unknown place of residence (Vranken et al., 2021[39]).

The government has made efforts to increase land consolidation in the last two decades, including through a legal reform in 2015 and projects supported by the governments of Sweden and the Netherlands that

aimed to develop the required legal and institutional framework and conducted pilot projects in selected regions (Hartvigsen, 2015[44]). While this work resulted in improvements in the registration of plots and a higher accuracy of land registry and cadastre records (Obradović, 2016[42]), actual land consolidation has been limited (Staničić, 2022[45]). Recently, efforts have been launched in this area, including a 2022 legal reform and projects supported by EU funding (Section 2.4.5).

1.2.5. Financial gaps and needs

Farmers' access to finance is a concern, but is improving

Between 2017 and 2022, there was an important decline in the financing gaps,[10] of the agriculture and food sectors. In the case of agricultural production, the gap shrunk from EUR 1 423 million to EUR 658 million (-54%), against an increase of 33% observed for the 24 EU Member States that are monitored.[11] Still, the gap relative to gross value added (GVA) was 39% in 2022, the fifth highest (fi-compass, 2023[46]).

According to surveys carried out in 2018 and 2019, barriers contributing to the financing gap include a perception of agriculture by commercial banks as a high-risk and unattractive lending sector; their lack of knowledge of the sector's needs and dynamics; difficulties by farmers to meet the banks' collateral requirements; a lack of credit history or accountancy records of loan applicants (in particular new entrants); and a lack of financial literacy, particularly in small family farms (fi-compass, 2020[47]).

The main drivers of farmers' demand for finance include renewing machinery and equipment following years of declining investments in physical assets; modernising outdated equipment and facilities; and meeting working capital needs (fi-compass, 2020[47]). Increasing capital investments could help build the sector's capital stock and bridge the productivity gap with the rest of the EU (World Bank, 2019[17]).

The financing gap for agro-food companies is smaller

Enterprises in the agro-food processing sector experienced an even stronger reduction of the financing gap from EUR 105 million in 2017 to EUR 15 million (-86%) in 2022 (fi-compass, 2023[46]).

The main factors generating financing gaps for food processing are similar to those for farmers, including the perception of high risk by banks particularly for small and medium enterprises (SMEs) and the lack of collateral. Other drivers are the low competitiveness of the companies, and low entrepreneurial skills and financial literacy (fi-compass, 2020[47]).

The most important drivers contributing to the demand for finance in the processing sector include investments in capacity expansion and technology modernisation, meeting working capital needs, developing new products and refinancing previous loans.

1.3. Structural change in the agro-food sector

1.3.1. Evolution of farm holdings

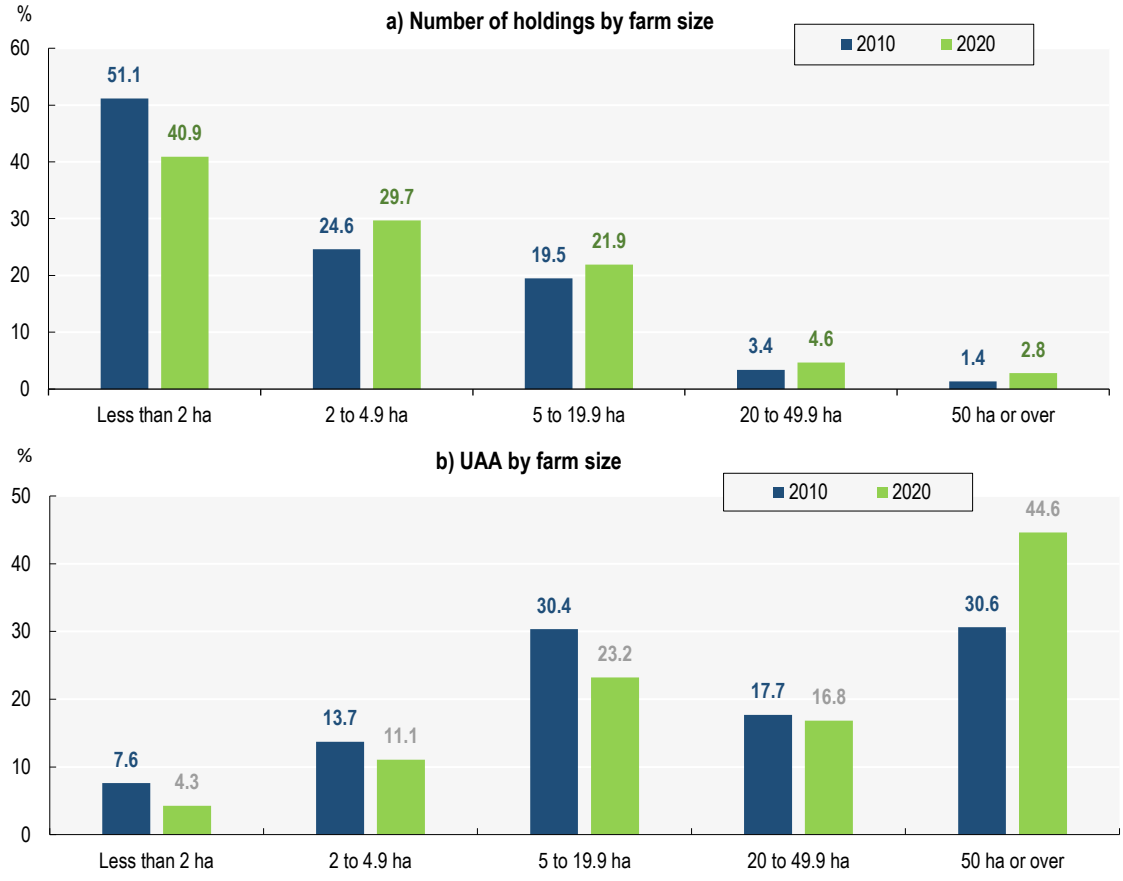
Over 70% of farms are small, but they hold only 15% of the agricultural area

The process of structural transformation in the Croatian agricultural sector is reflected in a reduced number of farm holdings, particularly among the smallest ones. Between 2010 and 2020, the number of farms fell by 38%, from 233 270 to 143 930. The average (mean) farm size increased from 5.8 to 8.6 hectares over the same period, almost half the EU average farm size of 17.4 hectares in 2020 (Eurostat, 2022[48]).

The farm structure in Croatia is characterised by large extremes: most farms are small, but the largest share of the land belongs to big holdings. Small units with less than 5 hectares make up 70.6% of the total number of holdings (Figure 1.5, panel a). Nevertheless, they hold only 15% of the utilised agricultural area (UAA), a lower share than in 2010 (Figure 1.5, panel b). At the other end of the scale, the largest commercial farms with 100 hectares or more represent only 1% of holdings, but cover 30% of the UAA (against 19% in 2010). At the same time, the share of holdings in the middle (between 5 and 49.9 hectares) increased from 23% to 26.5%, and they held 40% of the UAA 2020.

Figure 1.5. The distribution of farms is polarised

Distribution of Croatia's number of farms and UAA by farm size (ha), 2010 and 2020



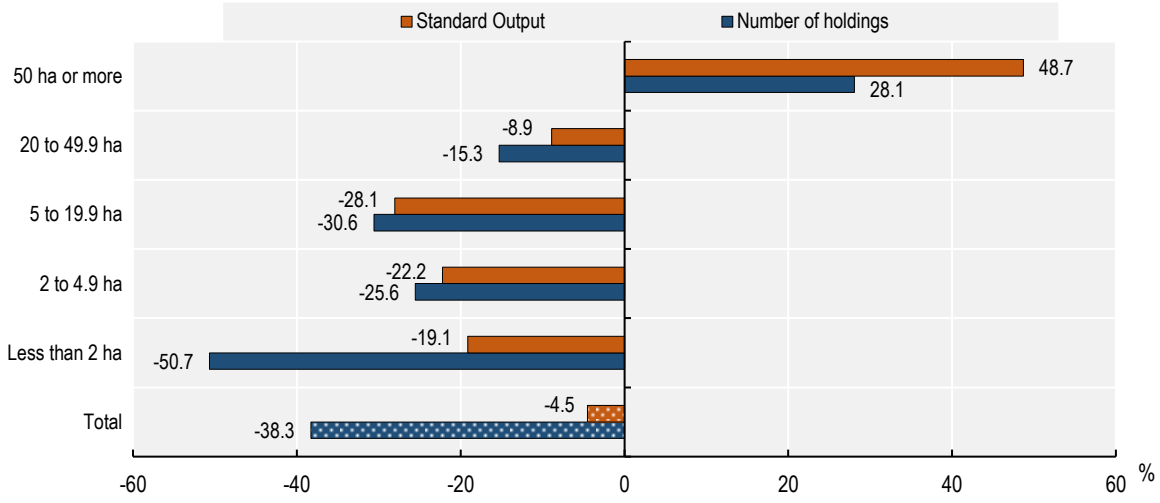
Source: Eurostat (2023), Farm indicators by agricultural area, type of farm, standard output, legal form and NUTS 2 regions [EF_M_FARMLEG], accessed July 2023.

In the last decade, output has increased only among larger holdings

Indicators of farm output by size show that the larger holdings of over 50 hectares were the only group that grew in numbers and had a higher output in 2020 compared with 2010. All smaller farm categories experienced a decrease in numbers and a decline in output during the decade (Figure 1.6).

Figure 1.6. Larger farms have grown in number and output

Percentage change in the number of farms and output by farm size, 2010-20



Source: Eurostat (2023), Farm indicators by agricultural area, type of farm, standard output, legal form and NUTS 2 regions [EF_M_FARMLEG] Accessed July 2023.

1.3.2. Trends in production and yields

After a few years of low or no growth, agricultural production has increased, supported by improved yields

Following decreases in 2013 and 2014 (in the context of a general recession) and very moderate growth up to 2017, the value of agricultural production has since recovered, with production in 2021 approaching its 2012 and estimates for 2022 and 2023 exceeding it (Eurostat, 2023[49]). Crops represent the largest share in production, with cereals (maize, wheat and barley) at the top, followed by oilseeds (soybeans and to a lesser extent sunflower and rapeseed), forage plants, and vegetables (mainly fresh vegetables, plants and flowers). The main livestock activities are cattle and pigs, followed by milk production (Table 1.2).

Both cereals and oilseeds have experienced important increases in the most recent years, with the strongest growth observed in the value of production of sunflower seed, wheat, soybeans and maize. With the exception of milk, livestock products, in particular cattle and pigs, have also recovered following significant decreases during the recession years (Figure 1.7).

Table 1.2. Crops, in particular cereals and oilseeds, dominate agricultural production

Changes in the composition of agricultural production

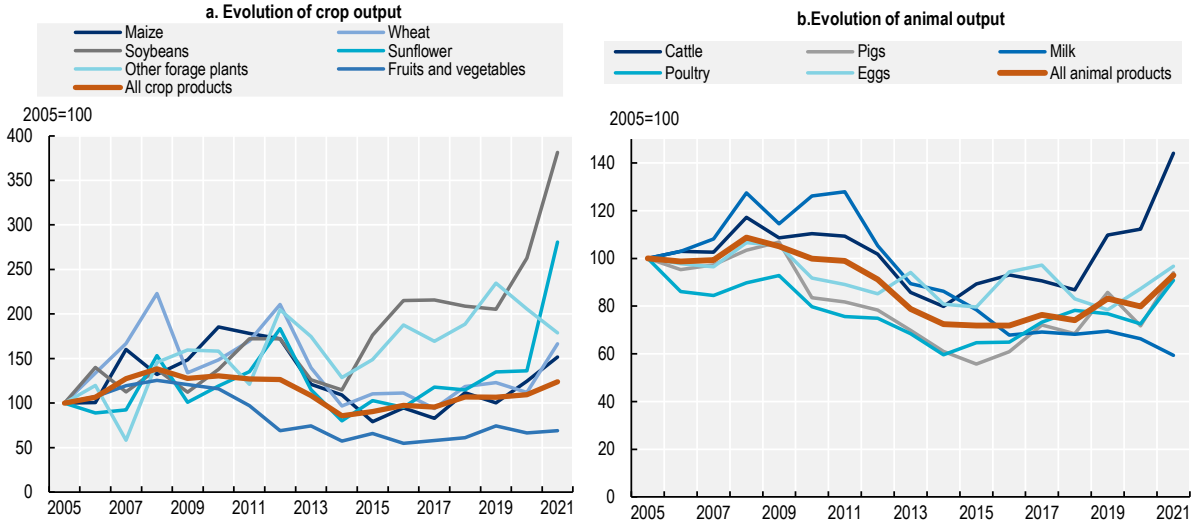
	Value (EUR million)			Share %		
Average of period	2005-07	2012-14	2019-21	2005-07	2012-14	2019-21
Crops, including	1 457.3	1 399.6	1 483.8	58%	62%	63%
Maize	288.5	321.8	301.0	12%	14%	13%
Wheat	140.0	156.3	140.4	6%	7%	6%
Soybeans	40.9	47.9	98.5	2%	2%	4%
Sunflower	27.2	36.7	53.5	1%	2%	2%
Other forage plants	85.8	156.7	191.1	3%	7%	8%
Vegetables and horticulture	332.2	189.6	240.5	13%	8%	10%

	Value (EUR million)			Share %		
Average of period	2005-07	2012-14	2019-21	2005-07	2012-14	2019-21
Fruits	148.4	105.4	67.8	6%	5%	3%
Wine	148.3	187.2	137.5	6%	8%	6%
Animal products, including	1 035.9	842.6	889.7	42%	38%	37%
Cattle	222.9	195.1	267.1	9%	9%	11%
Pigs	267.5	191.3	230.0	11%	9%	10%
Milk	264.7	239.0	166.1	11%	11%	7%
Poultry	128.9	96.6	114.4	5%	4%	5%
Eggs	67.9	60.0	60.5	3%	3%	3%
Total agricultural goods output	**2 493.2**	**2 242.2**	**2 373.6**	**100%**	**100%**	**100%**

Notes: Production values at current prices. "Maize" includes fodder maize.
Source: Eurostat (2023). Economic accounts for agriculture - values at current prices [aact_eaa01], accessed October 2023.

Figure 1.7. Oilseed production has experienced the strongest growth since 2005

Evolution of the value of crop and animal output, 2005-2021

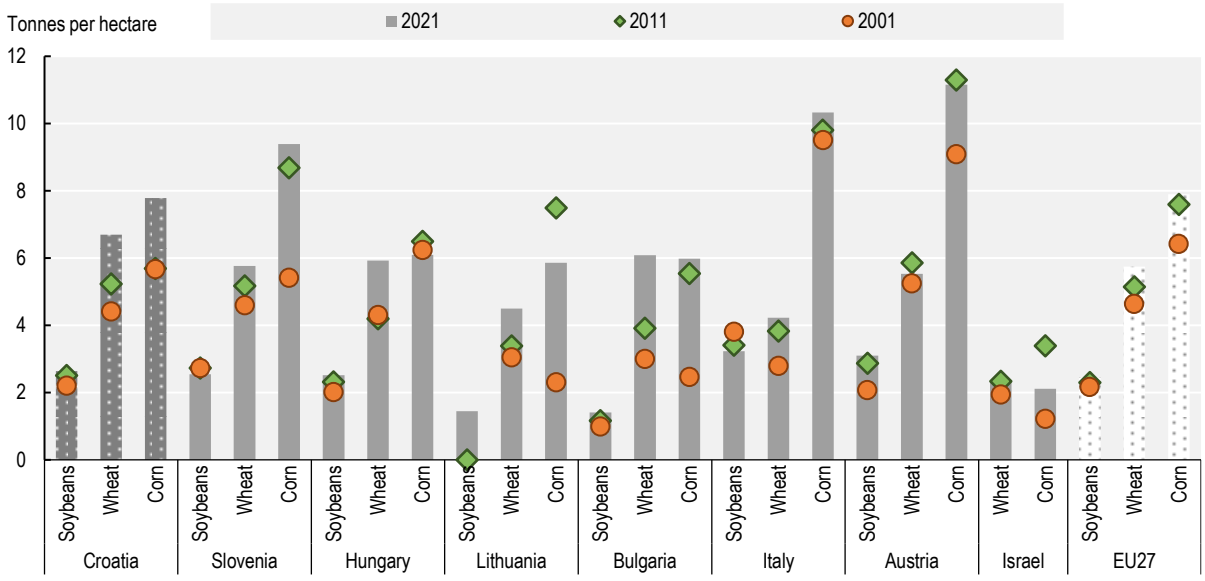


Note: "Maize" includes fodder maize.
Source: Eurostat (2023). Economic accounts for agriculture - values at current prices [aact_eaa01], accessed October 2023.

The yields of Croatia's three most important crops (corn, wheat and soybeans) have improved in the last two decades (Figure 1.8). These yields are not far from the EU average and in the case of wheat, they are above and higher than in several peer countries.

Figure 1.8. Wheat yields are higher than in peer countries

Evolution of the soybean, wheat and corn yields in Croatia and selected countries



Note: The EU average includes only the Member States that reported data.
Source: FAOSTAT (2023). Crops and livestock products. Accessed August 2023.

1.3.3. Trends in organic farming

Organic production and processing are growing, as is the size of the domestic market

Between 2011 and 2021, the organic area (including land in transition) grew from 32 035 to 121 924 hectares. Its share in total farmland increased from 2% in 2011 to 8% in 2021. In 2021, Croatia was fifteenth among the 27 EU Member States in terms of the share of organic area, above Hungary, Ireland, the Netherlands, Bulgaria, and Romania. Data from the Croatian Bureau of Statistics show a further increase in 2022, to 129 374 hectares, or 8.95% of the UAA.

Permanent grasslands make up 48% of the organic area as of 2022. The remaining area is distributed between arable (38%) and permanent crops (14%). Green fodder is the most important product, accounting for 46% of the arable organic crop production. Although covering a relatively small share of production (2% in 2022), the sector of aromatic and medicinal herbs has experienced remarkable growth: between 2013 and 2022, the volume produced duplicated and the area triplicated.

Production of organic livestock and animal products has also grown, although with a mixed picture for some sectors. The overall number of organically raised livestock increased from 34 430 in 2013 to 144 852 in 2022, with sheep making up 58% of the heads in 2022. Beef and veal made up three-quarters of the production of organic animal products, followed by lamb meat (21%). The production of organic eggs increased considerably, from 12 000 units in 2013 to 2.5 million in 2022. Organic cow milk production, however, has contracted since peaking in 2017 with a particularly dramatic decrease between 2021 and 2022 (Ministry of Agriculture, 2023[50]).

In 2022, there were 6 132 organic producers in Croatia. This represents a more than five-fold increase since 2010 and a considerable development of the sector since the first producers were certified in 2001-02 (Zrakić, Jež Rogelj and Grgić, 2017[51]). By 2021, Croatia was tenth in the European Union in the number of organic producers (FiBL, 2023[52]). While still small, the number of processors of organic products more than doubled between 2013 and 2022, from 143 to 380. Although the domestic organic market is small

relative to larger EU players,[12] the volume of retail sales grew from EUR 69 million to EUR 99 million between 2010 and 2021 (FiBL, 2023[52]).

1.4. Inclusiveness of the sector

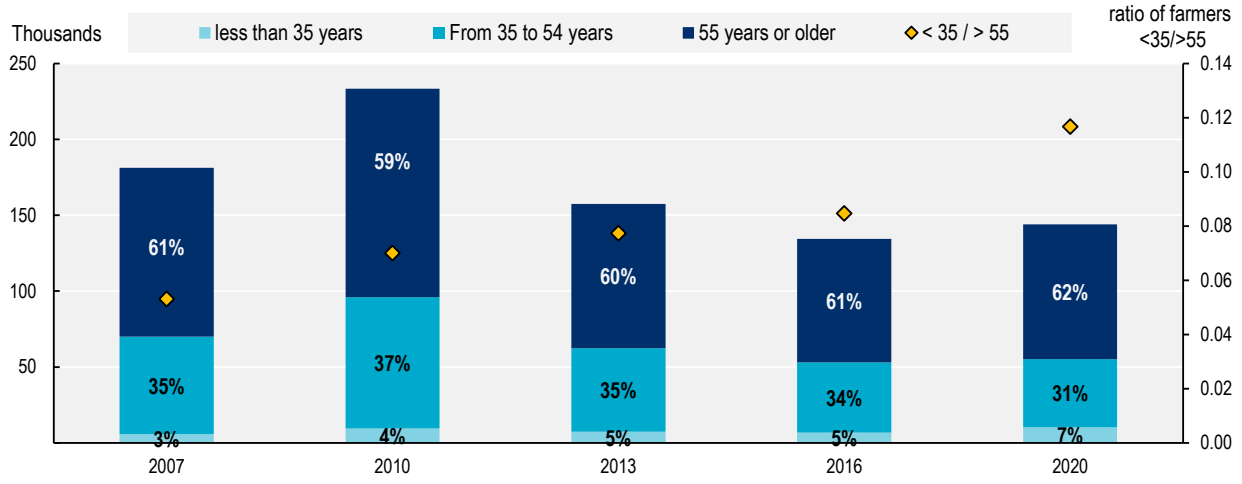
1.4.1. Generational renewal

The number of young farmers is increasing despite the challenging context

The age distribution of farm managers skews older. In 2020, 62% of farm managers were 55 or older. However, the number of young farmers (less than 35 years of age) is increasing. Both the number of holdings managed by young farmers and their share in all farm holdings have increased in the last decade. In 2020, young managers were in charge of 7% of holdings (Figure 1.9).[13]

Figure 1.9. The share of young farmers is increasing

Evolution of holdings by the age of their managers and the ratio of young farmers



Notes: The percentages refer to the share of the corresponding age group in the total number of farm managers. The ratio of young farmers is calculated as: Number of farmers less than 35 years / Number of farmers 55 years or older.
Source: Eurostat (2023). Farm indicators [EF_M_FARMANG], accessed in July 2023.

The increase in the number of young farmers is a positive development, particularly in light of the overall demographic trend of a shrinking population. The government has encouraged this trend by supporting young farmers (of 40 years of age or less) through different interventions under the EU Common Agricultural Policy (see also Sections 2.2 and 2.3).

Beyond generational renewal, a higher involvement of young farmers is expected to improve the economic performance of the sector. Farms with younger managers have been found to be more competitive and efficient. According to recent research, the average young farmer in 2016 used a larger area of agricultural land, raised more livestock, and earned on average EUR 18 288 more than the average Croatian farmer (Ministry of Agriculture, 2022[9]). In addition, although most Croatian farmers have only practical experience and no formal training, a larger share of young farmers has professional training (see also Section 4.3.5). According to the 2020 Agricultural Census, 23% of young farm managers had some agricultural training, against only 5% of those over 55 years old (Croatian Bureau of Statistics, 2021[18]).

Young farmers, however, face numerous barriers, including difficulties in access to land and financing. As of 2022, young farmers owned only 36% of the land they used (Ministry of Agriculture, 2022[9]). This can limit their access to finance due to insufficient collateral. In addition, a survey on the financial gaps in the sector found that a higher share of rejected or discouraged loan applications came from young farmers (fi-compass, 2020[47]). The low levels of participation in producer organisations and other forms of associations such as co-operatives (Section 5.1.3) also limits the possibilities for young farmers to connect and collaborate. Overall, the process of generational renewal is slow and most often driven by the closure of less competitive holdings managed by older farmers (Juničić, 2019[53]).

1.4.2. Gender

Women make up one-fourth of farm managers, but represent 54% of family labour

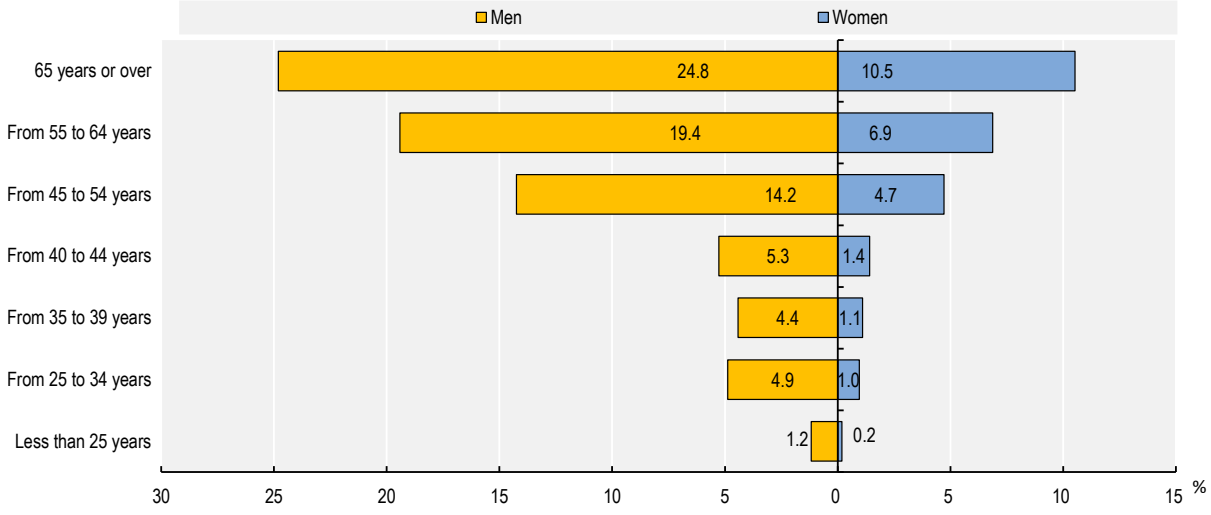
Seventy-four per cent of farm holders in Croatia were male in 2020 (Figure 1.10). This is above the European Union average (68%) (Eurostat, 2022[54]). While women made up 26% of farm managers, they constituted 54% of the farm's family workforce different from the holder. The regular non-family farm workforce, on the other hand, was almost two-thirds male (Croatian Bureau of Statistics, 2021[18]).

The age composition of female farm managers skews even more towards the older, with 67% being 55 years or older (against 60% in the case of males) and a lower share of female managers less than 35 years old (4% against 8% for males). This higher share of older female managers and lower share of younger women is also observed at the EU level.

More recent data point to positive trends in farm ownership by women. According to the Paying Agency for Agriculture, Fisheries and Rural Development (APPRRR), the share of female farm holders had increased to 29% at the end of 2023, and the average area of agricultural land used by female farmers grew by 5% between 2017 and 2023.[14]

Figure 1.10. Almost three-quarters of farm managers in Croatia are male

Distribution of farm managers by age and gender, 2020

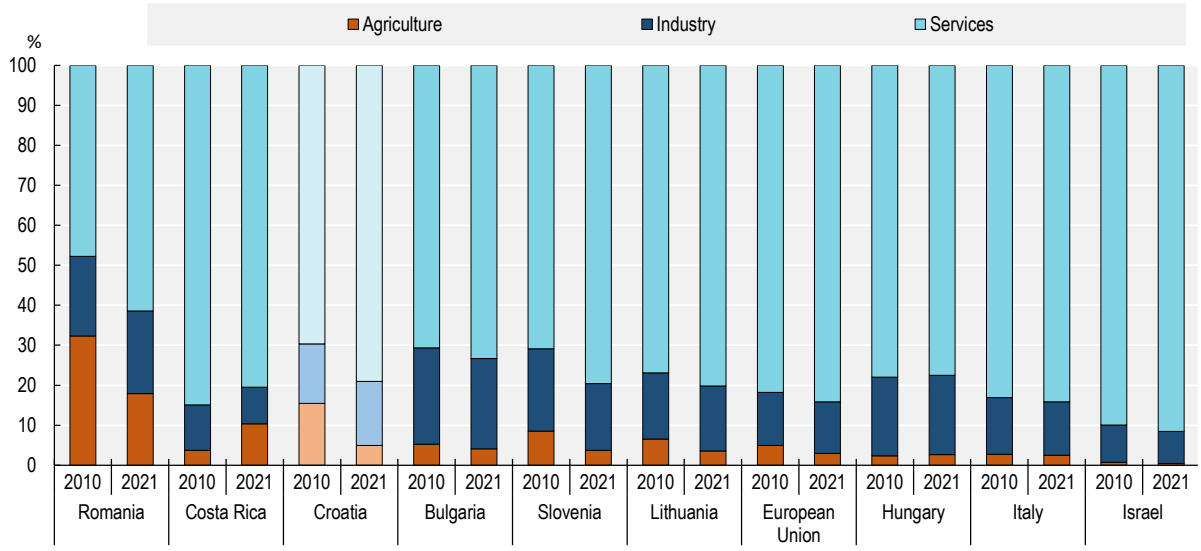


Source: Eurostat (2023). Farm indicators [EF_M_FARMANG], accessed in July 2023.

The overall gender gap in employment in Croatia is relatively narrow: in 2024 it was at around 6 percentage points against the OECD average of 14 percentage points (OECD, 2025[5]).The share of agriculture in total female employment has decreased, reflecting the overall reduction of employment in the sector discussed above. In 2021, about 5% of Croatian women were working in agriculture, compared with 15% a decade earlier. This decrease was compensated by the larger share of women employed in services. Still, agriculture is relatively more important in female employment in Croatia compared to several peer countries and the European Union (Figure 1.11).

Figure 1.11. The share of women employed in agriculture has decreased

Evolution in the composition of female employment by sector, 2010 and 2021



Source: World Bank (2023), World Development Indicators [database], accessed November 2023.

The gender gap in Croatia is relatively narrow, but women working in agriculture and from rural areas face employment barriers and disadvantages linked to traditional roles

Data for the whole economy shows that Croatia has a narrower gender gap in paid work compared with the OECD average: women earn on average around 8% less than men in Croatia, against 13% in OECD Member countries (OECD, 2023[11]). Nevertheless, differences in job quality remain a concern, including a greater share of women working on temporary contracts, as well as a higher burden from unpaid work (OECD, 2025[5]). Although data for comparing the gender gap in agriculture is not available, a 2019 government communication indicated that women employed in agriculture earn about 14% less than their male counterparts (Government of the Republic of Croatia - Office for Gender Equality, 2019[55]).

A 2017 study of segments of the population facing employment barriers in Croatia found that the group facing the highest number of obstacles was made up of women living primarily in rural areas (Ovadiya et al., 2017[56]). Given that women in Croatia spend nearly 20 hours more per week than men on unpaid work (OECD, 2025[5]), the regional disparities in access to services such as childcare and care for the elderly also disproportionately affect rural women. Sections 2.4.6 and 4.4.2 present examples of initiatives to support women in rural areas and those working in the farming sector.

1.4.3. Migration

Emigration has been a significant phenomenon throughout Croatia's history, with successive waves in the late 19th century, after World War II, during Croatia's War of Independence, and most recently following EU accession. Inward migration flows, however, have also been rising and in 2022 exceeded emigration flows for the first time in 15 years (Croatian Bureau of Statistics, 2023[57]).

A large number of Croatians, especially from rural areas, left after EU accession

Outward migration following EU accession has been a main driver of population decline. OECD destination countries reported almost 547 000 inflows of Croatian nationals to their territories between 2013 and 2021.[15] Peak annual values were reached in 2015 and 2016, after several EU countries lifted the remaining restrictions for Croatian workers (OECD, 2023[58]). According to the Croatian Bureau of Statistics (CBS), emigrants are getting younger on average. Although reliable statistics on their level of education are unavailable, exploratory estimates suggest that many are highly educated. Data on return migration is scarce, making it difficult to determine the extent to which the latest emigration wave has been temporary or permanent, but there is some evidence of accelerated returns, particularly after the COVID-19 pandemic (OECD, 2025[5]).

The situation of rural areas also motivates emigration, which in turn contributes to abandonment and depopulation that further aggravates their socioeconomic situation (Box 1.3). In 2022, 20 872 people emigrated abroad from the thirteen predominantly rural counties, representing 45% of the total. In 2012, the numbers were significantly lower, with 4 917 people leaving from rural counties (Croatian Bureau of Statistics, 2013[59]). Up to 2021, more people left rural areas than arrived, although this trend was reversed in 2022, in line with the trend at the national level (Croatian Bureau of Statistics, 2023[60]).

Box 1.3. Drivers of rural emigration

Large numbers have opted to leave Croatia's rural areas, which in turn aggravates rural problems

The depopulation of Croatian agricultural and rural areas has been continuous over the last three decades. Numerous factors motivate residents, particularly the younger generations, to seek better opportunities in other parts of Croatia or abroad.

Drivers of rural emigration include the bad quality or lack of infrastructure and public services or of support for the development of entrepreneurship. Young people often move to urban areas to finish their education and opt to stay due to the better employment opportunities and access to services (Mustać, 2020[61]). Negative perceptions about agriculture among young people also act as deterrents to return to the countryside and engage in farming.

Access to the EU labour market following accession in 2013 and the ongoing structural transformation of the agricultural sector have led to significant emigration from rural areas, in turn reducing the availability of agricultural labour and creating the need to hire immigrant workers.

One of the regions most impacted is eastern Croatia, which is traditionally focused on agriculture. This region was most affected by the war in the 1990s, suffering almost half of the direct demographic losses and the estimated damages in the country. In the years following the war, unemployment and other factors, including deindustrialisation and inappropriate models of ownership and privatisation, have structurally weakened the region and accelerated its depopulation (Majstorić, 2020[62]).

The decrease in labour availability has in turn promoted inward migration, particularly from new countries of origin

Immigration flows have been rising, in particular over the last five years. In 2022, for the first time since 2008, recorded immigration flows − almost 58 000 people − exceeded emigration flows (Croatian Bureau of Statistics, 2023[57]). The number of immigrants nearly quadrupled between 2017 and 2022, a trend responding to demand and attributable to policy changes to facilitate the immigration and employment of third-country nationals (OECD, 2025[5]) (see also Section 2.4.6). Up to 2018, over half of immigrants came from neighbouring countries. This has recently changed, with an increase of work-related immigration from Asia and a strong inflow from Ukraine following Russia's war of aggression.

Only a small percentage of the work permits issued for foreigners were for agricultural workers. In 2022, Croatia issued 2 957 permits for the agriculture and fisheries sector, or 2.4% of all permits. Although no data on work permits granted in the food processing industry is available, the Croatian Employment Service (CES) reported issuing a positive opinion for 4 015 work permit applications in the sector in the first eight months of 2023.[16] Seasonal immigration is particularly noticeable in the summer period, with tourism a major driver of demand. The CES recorded a demand for 29 832 seasonal workers in 2022, although only 17 907 of these positions were filled. Sixty per cent of the positions were in the accommodation and food sectors, while only 2% were employed in agriculture, forestry and fisheries (Croatian Employment Service, 2023[63]).

1.4.4. Minorities

Minorities make up 8% of the population, with the Roma facing the most difficulties

According to the 2021 Population Census, Croatia is largely ethnically homogenous, with 3.5 million inhabitants, or 91.6% of the population, identifying as ethnic Croat. The most numerous national minorities residing in the country are Serbs (3.2%), Bosniaks (0.6%), and Roma (0.5%) (Croatian Bureau of Statistics, 2023[64]). They are part of the 22 national minorities explicitly recognised in the Constitution (Office for Human Rights and Rights of National Minorities, 2023[65]). However, census figures, which are based on self-identification, may be underestimated (OECD, 2025[5]). Policy initiatives aimed at supporting national minorities are discussed in Section 2.4.6.

Most members of the Serbian national minority live in the counties of Vukovar-Srijem, Sisak-Moslavina, Karlovac, Bjelovar-Bilogora, Primorje-Gorski Kotar and Osijek-Baranja, all of which are predominantly rural. The majority of the Bosniak population lives in the City of Zagreb and in the counties of Primorje-Gorski Kotar, Sisak-Moslavina and Istria (Office for Human Rights and Rights of National Minorities, 2023[66]). The latter two counties are predominantly rural.

The Roma population in Croatia faces higher poverty and unemployment rates, poor housing conditions, poor healthcare, and low education levels (World Bank, 2019[67]). Over 92% are poor, with 70% living in extreme poverty. Roma men and women from rural areas are more often affected by unemployment. Around 7% of the Roma population is employed in agriculture, forestry, fishery, and hunting. This share is higher for younger people: 10% of men and 5% of women of 18-29 years of age work in these sectors (Office for Human Rights and Rights of National Minorities, 2021[68]).

1.5. Trade and participation in global value chains

1.5.1. Evolution of agro-food trade

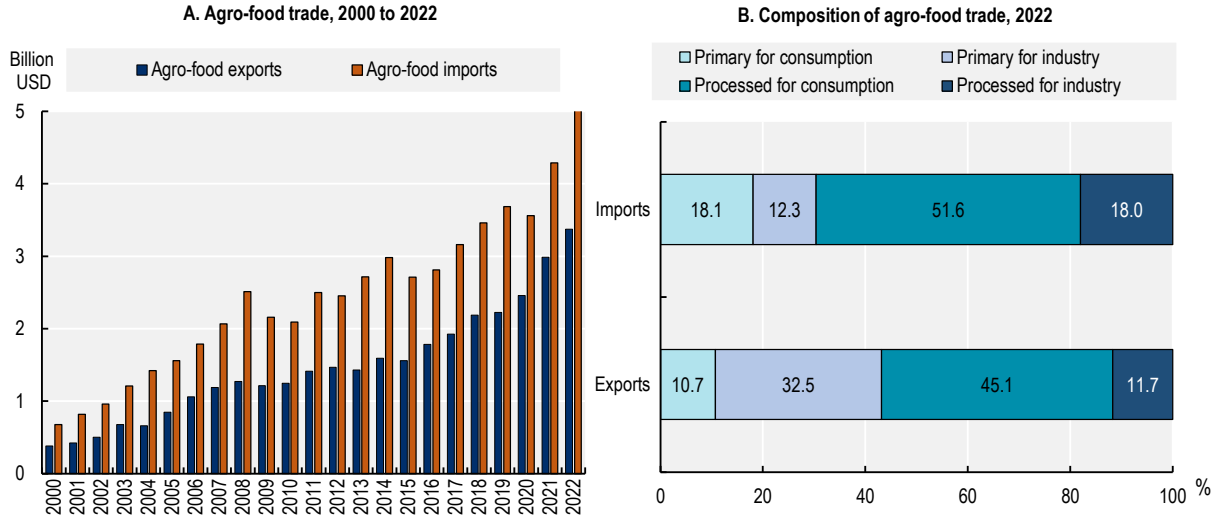
Agro-food trade growth slowed down and the deficit grew in the last decade

Croatia has traditionally been a net agro-food importer (Figure 1.12, panel A). In 2022, agro-food products made up 13% of the total goods exports and 11% of imports. These shares have remained relatively stable in the last decade, and are slightly higher than in 2000, when the sector represented around 9% of both exports and imports. Processed goods for consumption and industry make up 57% of agro-food exports and 70% of imports (Figure 1.12, panel B).

Since EU accession in 2013 to 2022, agro-food exports grew at an average annual rate of 8.9%, slightly higher than the average annual growth of imports (7.8%). This represents a deceleration from the previous decade: in 2003-12, exports grew at an average of 12% and imports at 10.6%. In the three most recent years, exports have experienced stronger annual growth up to 21% in 2020-21. After a decline of 3% in 2019-20, imports also accelerated after 2020.

Notwithstanding the higher annual growth of exports, Croatia has maintained an agro-food trade deficit over the last decades. As of 2022, the value of agro-food imports was 1.5 times the value exported, which represents a decrease from a ratio of 1.8 in 2000. The deficit has grown mainly due to a negative intra-EU agro-food trade balance − which increased from USD 1.5 billion in 2013 to USD 1.9 billion in 2022 – while the balance with non-EU countries remained positive in the same period.

Figure 1.12. Agro-food trade has expanded and the deficit widened since 2000



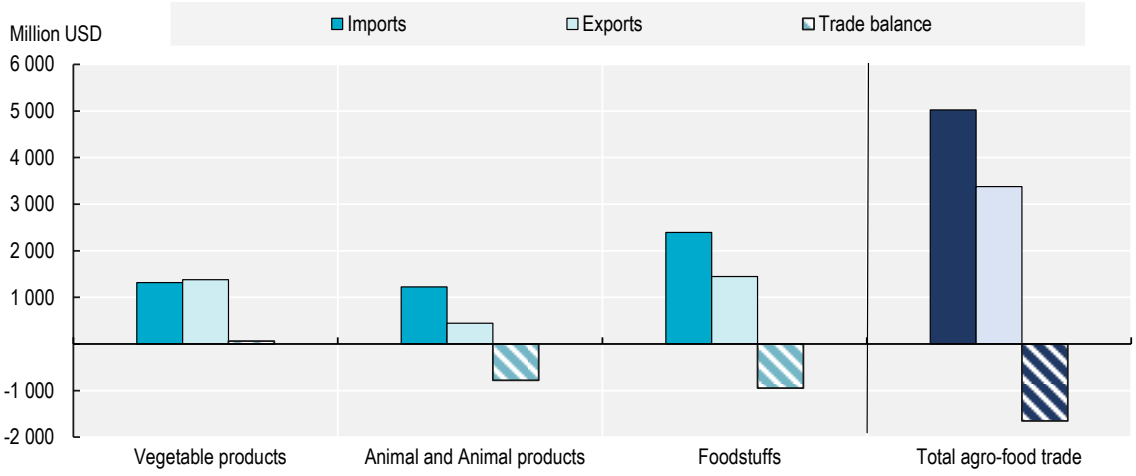
Note: Agro-food definition does not include fish and fish products. Agro-food codes in H0: 01, 02, 04 to 24 (excluding 1504, 1603, 1604 and 1605), 3301, 3501 to 3505, 4101 to 4103, 4301, 5001 to 5003, 5101 to 5103, 5201 to 5203, 5301, 5302, 290543/44, 380910, 382360.
Source: Authors' calculations based on UN Comtrade (database), http://comtrade.un.org/ [accessed November 2023].

Grains and oilseeds are the strongest export sectors

An examination of 2022 agro-food trade by product groups shows that Croatia had a small trade surplus in vegetables (Chapters 06 to 15 of the Harmonised System), whereas trade of animal products (Chapters 01-05) and of foodstuffs (Chapters 16-24) had a negative balance (Figure 1.13).

Figure 1.13. Vegetable products are the only category with a trade surplus

Trade balance by product group, 2022



Note: Animal and animal products do not include fish and its products.
Source: Authors' calculations based on UN (2022), UN Comtrade (database), http://comtrade.un.org/ [accessed November 2023].

The top ten export headings in 2022 represented 45% of agro-food exports (Table 1.3). They include maize, chocolate and cocoa, wheat, prepared foods such as bread and sauces, live bovine animals, and soybeans. The top import product was fresh swine meat. Other important import headings include bread and pastries, preparations for animal feeding, chocolate, milk, cheese, beef, and beverages.

Table 1.3. Grains, chocolate and soybeans are among the most important export products

Top 10 agro-food products exported and imported, 2022

Code HS-4	Product description	Exports (thousand USD)	Share %	Code HS-4	Product description	Imports (thousand USD)	Share %
1005	Maize or corn	318 006	9.4%	0203	Meat of swine, fresh, chilled or frozen	262 267	5.2%
1806	Chocolate and preparations with cocoa	230 592	6.8%	1905	Bread, pastry, cakes, biscuits	247 039	4.9%
1001	Wheat and meslin	210 275	6.2%	2309	Animal feed preparations	245 347	4.9%
1905	Bread, pastry, cakes, biscuits	142 534	4.2%	1806	Chocolate and preparations with cocoa	203 610	4.1%
2106	Food preparations, n.e.s.	131 859	3.9%	0406	Cheese and curd	191 621	3.8%
0102	Live bovine animals	113 974	3.4%	2106	Food preparations, n.e.s.	182 821	3.6%
1201	Soya beans	106 748	3.2%	0401	Milk and cream	152 035	3.0%
1512	Sunflower, safflower or cottonseed oil	104 935	3.1%	1512	Sunflower, safflower or cottonseed oil	138 326	2.8%
1602	Prepared or preserved meat	88 991	2.6%	0201	Bovine meat, fresh or chilled	135 251	2.7%
2103	Sauces and condiments	88 243	2.6%	2202	Waters and non-alcoholic beverages	133 773	2.7%
Subtotal top 10 products		**1 536 157**	**45.5%**	**Subtotal top 10 products**		**1 892 092**	**37.7%**
Other products		1 839 217	54.5%	Other products		3 132 508	62.3%
Total agro-food exports		**3 375 374**	**100.0%**	**Total agro-food imports**		**5 024 600**	**100.0%**

Note: The HS descriptions have been simplified and are provided only as a reference.
Source: Authors' calculations based on UN (2022), UN Comtrade (database), http://comtrade.un.org/ [accessed November 2023].

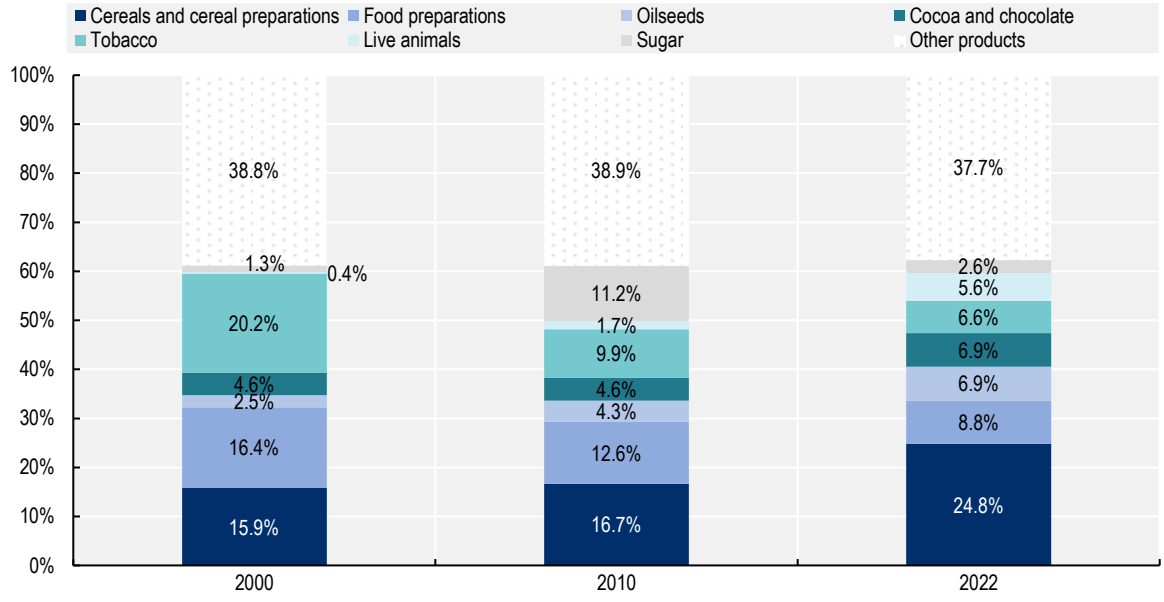
Export patterns changed over the last two decades, with sugar in particular, losing importance

The composition of Croatian agro-food exports has changed over the last decades (Figure 1.14). Cereals and their preparations have gained in importance, with their share increasing from 16% to 25% between 2000 and 2022. The export share of live animals grew from 0.4% to 6% in the same period, and oilseeds also gained in importance. Two products, sugar and tobacco, lost important shares. Sugar experienced a boost early in the period, becoming one of the top five export products in all but one year over the 2001-16 period. Its share in agro-food exports peaked at 20% in 2006, but declined to 3% in 2022 along with the value exported, particularly after 2016 and driven by the abolition of the EU sugar quota system (Box 1.4). In the case of tobacco, the value exported has increased but as other products gained importance, its share in exports shrunk from 20% in 2000 to 7% in 2022 (UN Comtrade, 2023[69]).

The composition of imports, however, has remained relatively stable. The products that stand out as having increased their shares in agro-food imports between 2000 and 2022 include meat (from 6.5% to 12%) and cereal preparations (from 5% to 9%). Imports of live animals and of coffee and tea lost shares, from 7% to 3% and from 6% to 2%, respectively.

Figure 1.14. Cereals and oilseeds have gained importance, while sugar and tobacco lost importance

Composition of agro-food exports, 2000, 2010 and 2022



Note: Export sectors defined at the HS chapter level: live animals (01), cereals and cereal preparations (10 and 19), oilseeds (12), sugar (17), cocoa and chocolate (18), food preparations (21), tobacco (24).
Source: Authors' calculations based on UN Comtrade (database), http://comtrade.un.org/ [accessed November 2023].

Box 1.4. Evolution of the sugar sector

Sugar beet production and sugar exports have collapsed in recent years

For a long time, sugar production was a profitable and successful activity and one of Croatia's leading export industries. However, fluctuations in world prices and changes in EU policy have contributed to its collapse: between 2012 and 2022, the production of sugar beet in Croatia was more than halved (Eurostat, 2023[49]), leading to the closure of processing facilities.

The abolition of sugar production quotas in the European Union was an important driver of this collapse. These quotas, in place for almost 50 years, were terminated in September 2017; their abolition led to a decrease in domestic prices (OECD/FAO, 2019[70]) that motivated structural changes and a consolidation of the European sector. This was also the case in Croatia, where the three large sugar mills merged into a single company at the end of 2018 (Felić, 2022[71]). While EU sugar producers had access to a mechanism that provided EUR 5.4 billion to support the industry's restructuring and help it to prepare for the quota abolition, it operated between 2006 and 2010, prior to Croatia's accession to the European Union, so the Croatian industry did not benefit from these funds. Croatian sugar mills also faced increased competition from the largest European players such as Südzucker group from Germany, Cristalco from France, and Agrana from Austria, as well as from non-EU countries such as Brazil (Repecki, 2021[72]). Other issues affecting production in Croatia include sugar beet rot due to weather conditions and fluctuations in world prices (Kuskunović, 2023[73]). Considering these circumstances, Croatia provides coupled support to the production of sugar beet using EU and state funds (see Sections 2.3.3 and 2.4.2).

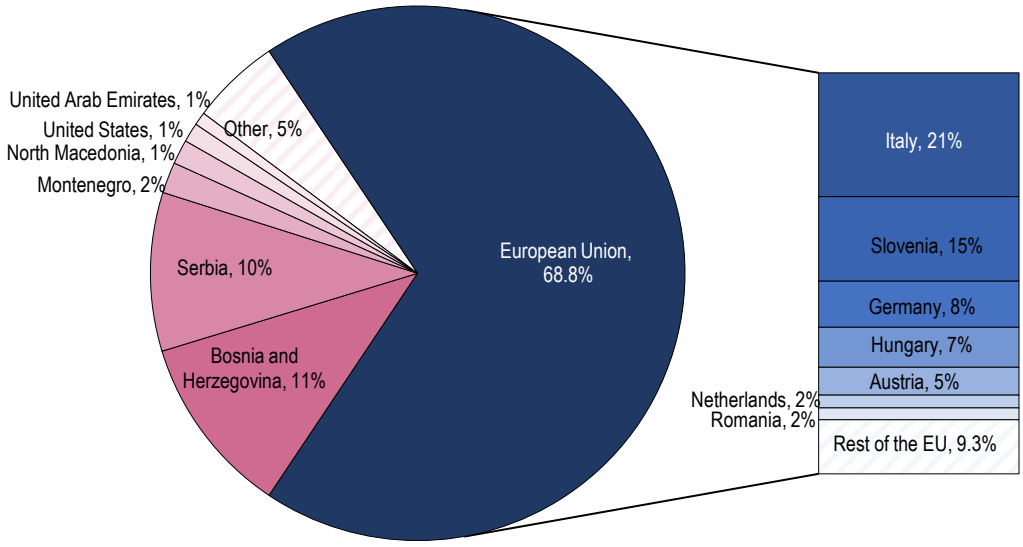
Croatia mainly trades agro-food products with EU partners, from which 85% of its imports originate

Two-thirds of Croatia's agro-food exports and 85% of imports in 2022 were intra-EU (Figure 1.15). The top destinations for exports within the European Union were Italy (21%), Slovenia (15%), and Germany (8%). The most important non-EU partners were Bosnia and Herzegovina (11%) and Serbia (10%). Exports to countries outside of Europe are relatively low, with the United States as the top export destination outside the continent (1%).

The largest share of agro-food imports originated from Germany (14%), followed by Italy, Hungary (11% each), and Slovenia (10%). The main non-EU import sources were Serbia (6%), Bosnia and Herzegovina (2%), North Macedonia (1%) and Türkiye (1%) (Figure 1.16).

Figure 1.15. Non-EU neighbour countries are the destination of one-fourth of exports

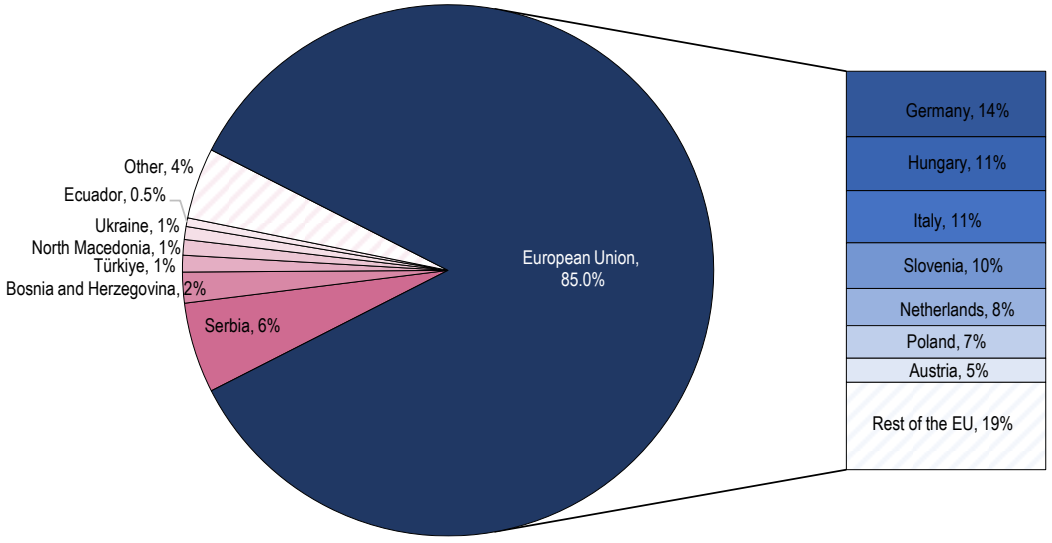
Main export destinations for agricultural and food products, 2022



Source: Authors' calculations based on UN (2023), UN Comtrade (database), http://comtrade.un.org/ [accessed November 2023].

Figure 1.16. EU partners supply most of Croatia's agro-food imports

Main import sources for agricultural and food products, 2022



Source: Authors' calculations based on UN (2023), UN Comtrade (database), http://comtrade.un.org/ [accessed November 2023].

Trade with EU partners is more dynamic than with third countries, particularly following EU accession

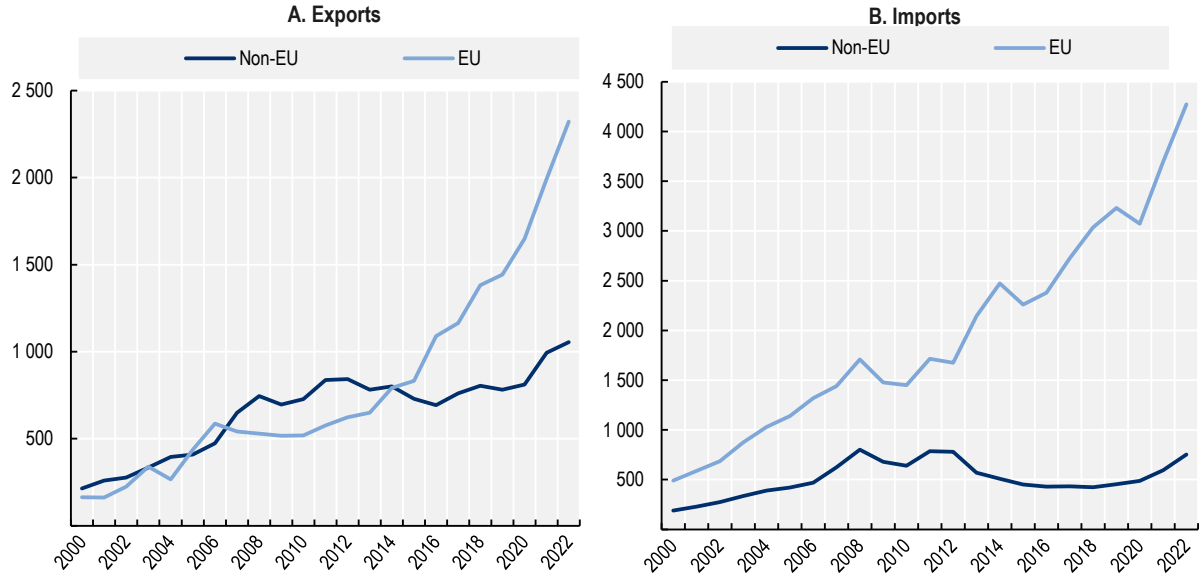
Agro-food trade with EU partners showed an increasing trend over the last two decades, and the gap between intra-EU and extra-EU trade widened following EU accession (Figure 1.17). Between 2000 and 2013, exports to and imports from EU Member States grew at higher average annual rates than for non-

EU partners: 14% against 11% for exports and 13% against 10% for imports respectively. After accession, this gap increased and, between 2014 and 2022, exports to EU partners grew at an average annual rate of 15% against 6% for non-EU partners. During the same period, imports from EU partners grew 8% against 4% for non-EU partners.

Bosnia and Herzegovina, which had traditionally been the top destination of Croatia's exports, moved to the second place in 2017 and to the third in 2019. Its share in exports fell from 33% in 2010 to 11% in 2022. On the import side, Brazil was the most affected partner: in 2010, it was the sixth most important import source, with a share of 7%, but by 2022 its share in imports had declined to 0.4%.

Figure 1.17. The gap between EU and non-EU trade has widened since 2014

Evolution of agro-food trade with EU and non-EU trading partners, 2000-22



Note: EU data refers to the EU-28 (including the United Kingdom) up to 2019 and the EU-27 thereafter.
Source: Authors' calculations based on UN Comtrade (database), http://comtrade.un.org/ [accessed November 2023].

1.5.2. Integration of the agro-food sector in international markets

Both agriculture and food have deepened their participation in global value chains

The OECD Trade in Value Added (TiVA) database considers the value added by each country in the production of goods and services that are traded and consumed worldwide, providing a broad view of where value is created at each stage of global value chains (GVCs). An examination of international value-added flows related to the agro-food sector (Box 1.5) gives a perspective of countries' integration into GVCs that goes beyond conventional trade data.[17]

TiVA data reveal international flows of value added that are not captured by traditional trade statistics. In some cases, the top destinations of value-added exports and sources of value-added in domestic demand differ from the top trading partners in terms of gross exports and imports. For example, higher shares of Croatia's agro-food value added go to Germany, the United States, France, and the United Kingdom than the gross export data indicates. On the import side, while the People's Republic of China represents less than 1% of agro-food imports, it is among the top 10 sources[18] of agro-food value added in Croatia's domestic demand.

Box 1.5. Indicators to measure engagement in global value chains and identify value adding pathways in agriculture and food trade

Exploring trade in value added provides insight into the different types of value creation for the agricultural sector. Direct exports of agricultural value added occur from the sector itself through primary product exports. Indirect exports of agricultural value added embodied in other exports represent the agricultural value added that is exported by other domestic industries, for example in processed or transformed products. At the same time, there are important shares of value addition from services and industrial sectors in the export value of agricultural products. Services represent a wide range of activities including business services (such as agricultural consultants and contractors), transport and trade services, which, in the same way as food processing, can increase domestic value creation.

OECD research has identified two value adding pathways related to trade and GVC engagement. The first is a processing pathway, where domestic value addition to agriculture and links to trade and GVCs occur through downstream processing sectors. The second is a primary pathway, where domestic value addition is made to the primary product, and the sector's engagement in trade and GVCs is via direct exports for foreign processing or foreign final demand. The research found that countries participating in trade and GVCs via the primary pathway generated equivalent overall trade-related domestic value-added returns as those participating via the processing pathway. A key difference was the share of services value-added, which was higher in countries that followed the primary pathway.

These two pathways are captured in two key indicators that measure a country's degree of engagement in GVCs: i) backward participation, which measures the share of imported intermediates embedded in the country's exports and represents the processing pathway; and ii) forward participation, which measures the share of exports that form an intermediate into other countries' exports and represents the primary pathway.

Source: Greenville, Kawasaki and Jouanjean (2019[74]); OECD (2020[75]).

Croatia's agriculture and food industry have deepened their forward and backward linkages with global production networks over the last two decades (Table 1.4). The foreign value-added content of agriculture and food exports from Croatia to the world increased across the period, as did the share of Croatian value added embodied in other countries' exports of these sectors. In general, 2020 indicators of backward and forward linkages in both industries are below the EU average.

While agriculture increased its reliance on foreign final demand between 2000 and 2020, the food, beverages and tobacco industry reduced it, as the share of its domestic value-added meeting foreign final demand declined from 28% to 24%.

The foreign value-added (FVA) content of agriculture (27%) and food exports (32%) are above the FVA share observed in 2020 for the Croatian economy (24.5%). The highest FVA shares in the economy are found in industries such as basic metals (47%) and transport equipment (46%).

Croatia is roughly in the middle of the peer group in terms of the FVA content of exports for both agriculture and food. Austria, Lithuania and Hungary all showed higher FVA shares in both sectors. Like Croatia, most peer countries increased the FVA content of their agriculture and food exports between 2000 and 2020 (Figure 1.18).

Table 1.4. Agriculture and food have increased their forward and backward linkages

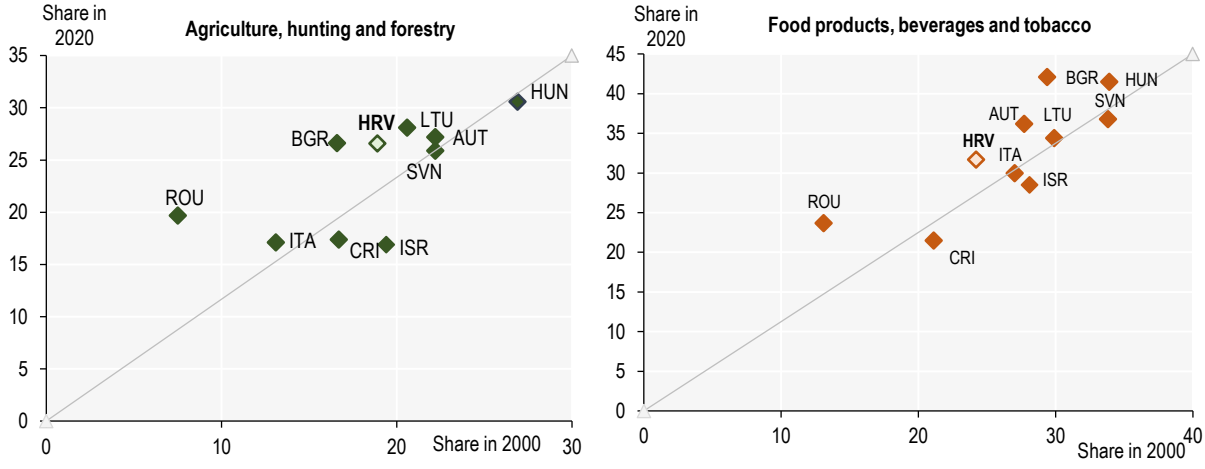
Evolution of indicators of participation in global value chains

	Croatia			EU-27 average		
	2000	2010	2020	2000	2010	2020
Agriculture, hunting and forestry						
Backward linkages: Foreign value added in exports	18.90	21.50	26.60	22.27	28.27	28.61
Forward linkages: Domestic value added embodied in foreign countries' exports	0.20	0.40	0.40	0.29	0.38	0.46
Share of industry's value-added meeting foreign final demand	24.20	24.70	33.70	36.44	45.11	50.47
Food, beverages and tobacco						
Backward linkages: Foreign value added in exports	24.20	25.90	31.70	31.59	35.34	36.87
Forward linkages: Domestic value added embodied in foreign countries' exports	0.70	0.90	1.20	0.94	1.11	1.22
Share of industry's value-added meeting foreign final demand	28.70	23.20	23.70	29.15	34.63	37.33

Notes: The value for the European Union is a simple average of the values for its members in the corresponding year. The table refers to the TiVA indicators EXGR_FVASH (foreign value added embodied in the industry's exports as a percentage of industry's total exports); EXGR_DVAFXSH (domestic value added content embodied in the exports of the industry in foreign countries, as a percentage of country's gross exports), and VALU_FFDDVA (share of the industry's value added that ultimately meets foreign final demand – whether as a direct or an indirect export).
Source: OECD (2023), Trade in Value Added (TiVA) [database], oe.cd/tiva (consulted November 2023).

Figure 1.18. Croatia is in the middle of the peer group in terms of export FVA

Evolution of foreign value added in exports between 2000 and 2020



Source: OECD (2023), Trade in Value Added (TiVA) [database], oe.cd/tiva (consulted November 2023).

The foreign services content of agro-food exports is increasing

TiVA indicators highlight the trend of "servicification" of global value chains,[19] reflected in an increase in exports of services value-added, both direct and indirect (in particular services embodied as inputs in the exports of goods). For Croatia, the total services content (domestic and foreign) is higher for the food industry than for agriculture (31% vs. 23% in 2020) and has been increasing since 2000, although it remains lower than the EU average (Table 1.5). The content of foreign services has increased in both sectors, pointing to deeper integration in global value chains. In both cases the foreign services content as of 2020 was below the EU average.

Table 1.5. Agro-food exports have a growing foreign services content

Evolution of the services value-added content of exports

	Croatia			EU-27 average		
	2000	2010	2020	2000	2010	2020
Agriculture, hunting and forestry						
Foreign services content	8.20	9.40	13.20	10.71	14.01	15.11
Domestic services content	9.50	10.40	9.50	12.55	14.11	13.40
Total services content	17.70	19.80	22.70	23.26	28.12	28.51
Food, beverages and tobacco						
Foreign services content	11.10	11.70	15.90	15.05	18.16	19.94
Domestic services content	11.90	15.80	15.50	17.24	18.80	17.49
Total services content	23.00	27.50	31.40	32.29	36.96	37.43

Notes: The value for the EU is a simple average of the values for its members in the corresponding year. Share of value-added originating from all domestic and foreign service industries in total gross exports by industry. Service industries include construction, wholesale and retail, hotels and restaurants, transport and communications, finance, real estate and business services as well as public services.
Source: OECD (2023), Trade in Value Added (TiVA) 2022 edition (database), oe.cd/tiva (consulted November 2023).

1.6. Conclusions

Croatia has made significant economic and human development progress since its independence. The loss of a large share of its population driven by emigration nevertheless poses a considerable challenge. Rural areas are also at a disadvantage, with a deep urban-rural gap across many economic and social dimensions.

The economy is highly concentrated on services, especially tourism. Agriculture has a relatively small − and shrinking − share of GDP and employment. The sector is experiencing a structural transformation that is also observed in other EU and non-EU countries. The number of farms is decreasing, with larger holdings increasing in number and output in the last decade.

Despite these changes, small, family-run farms continue to be the backbone of Croatia's rural areas and land consolidation remains a challenge. Most farms are family-run, and over 70% are small, even if they hold only 15% of the agricultural area. Farm income increased following EU accession but still has a long way to go to converge with the EU average.

Croatia has a high diversity of agricultural activities and agricultural production has picked up recently after several years of low growth or decline in the context of a severe economic recession. The sector's share in total exports and imports has increased since 2000. Organic farming and related processing activities are also growing,

There are some pending tasks related to the management of state-owned land and to land consolidation, which have historical roots in the previous socialist system. An estimated one-third of agricultural land in Croatia is publicly owned, but there is no definitive data on the total area under public ownership. In addition, plots in private hands are generally small and highly fragmented, and past land consolidation efforts have yielded limited results, although efforts in this area have been stepped up in recent years.

Although farmers' access to credit is improving, some continue to face constraints, particularly the younger ones. This can be linked to land access and difficulties to meet collateral requirements. Nevertheless, an increase in the number of young farmers is an encouraging development in light of the challenging context.

Women make up about one-fourth of farm managers, but represent over half of farm family labour. While rural women remain affected by employment barriers and face obstacles linked to traditional gender roles

and regional disparities in access to services, recent data points to a positive evolution in female farm ownership.

Emigration has been an integral part of Croatia's history and there was an important wave following EU accession in 2013 when many people, especially from rural areas, left the country. This has created a labour market gap that is increasingly being filled by workers from non-EU countries. In 2022, inward migration flows exceeded emigration flows for the first time in 15 years.

Total agro-food trade growth has slowed and the trade deficit grew in the last decade. However, Croatia increasingly trades agro-food products with EU partners, particularly after accession. Exports are dominated by cereals and oilseeds, with the collapse of the sugar sector marking a notable change in the composition of exports. In general, the agriculture and food sectors have deepened their linkages with global value chains and there is an increase in the services content of agro-food trade.

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Notes

[1] Unless other references are specified, the main sources of this report are Croatia's responses to a questionnaire of the OECD Committee for Agriculture and subsequent follow-up, information collected in connection with the OECD Secretariat's fact-finding mission, and information provided by Croatia to the OECD in the context of the annual agricultural policy monitoring.

[2] The EU territory is subdivided into regions at three levels, from larger to smaller units (NUTS 1, 2 and 3). The urban-rural typology is applied to NUTS 3 regions. "Predominantly rural" regions are those where at least 50% of the population live in rural grid cells, or 1 km² cells with a population density of less than 300 inhabitants per km² and/or fewer than 5 000 inhabitants (Eurostat, 2020[77]).

[3] The predominantly rural counties are Bjelovar-Bilogora, Istria, Karlovac, Koprivnica-Križevci, Krapina-Zagorje, Lika-Senj, Međimurje, Požega-Slavonia, Sisak-Moslavina, Virovitica-Podravina, Vukovar-Sirmium, Zadar, and Zagreb County.

[4] The choice of illustrative peer countries for Croatia includes a mix of significant EU trading partners, small non-EU OECD Members and fellow OECD accession candidates: Austria, Bulgaria, Costa Rica, Hungary, Italy, Israel, Romania, and Slovenia.

[5] The United Nations' Food and Agriculture Organization (FAO) defines a family farm as "a means of organizing agricultural, forestry, fisheries, pastoral and aquaculture production which is managed and operated by a family and predominantly reliant on family labour (...)".

[6] Annual Working Unit (AWU) is the measure used to describe the work carried out by one person who is working full-time on a farm. It is equivalent to the total hours worked divided by the average hours worked in full-time jobs in the country.

[7] Average farm net value added (FNVA) per AWU is equal to gross farm income minus the depreciation costs. It considers agricultural support and income taxes. Measuring farm income per AWU allows to account for the different farm scales and provides a better measurement of agricultural labour productivity.

[8] Information from the Croatian Bureau of Statistics, provided to the OECD by the Ministry of Agriculture.

[9] Information on the regions' main activities provided by the Ministry of Agriculture in the context of the OECD fact-finding mission and complemented by (Franić and Mikuš, 2013[76]).

[10] Fi-compass, the platform for advisory services on financial instruments under EU shared management, defines this gap as the unmet financing demand from economically viable farms and agri-food SMEs. It includes loans applied for but not obtained, financing refused by the potential borrower, and loans not applied for due to fear of rejection.

[11] Austria, Belgium, Bulgaria, Croatia, the Czech Republic, Denmark, Estonia, Finland, France, Germany, Greece, Hungary, Ireland, Italy, Latvia, Lithuania, the Netherlands, Poland, Portugal, Romania, Slovakia, Slovenia, Spain, and Sweden.

[12] Germany is the EU country with the largest market for organic products, with 2021 retail sales of EUR 15.9 billion. Among the Member States that joined the European Union after 2004, the largest market is Poland, with EUR 314 million.

[13] In the context of the EU Common Agricultural Policy, the definition of "young farmer" sets a maximum age of 40 years. If this threshold is considered, 14% of farm managers in Croatia at the end of 2023 were young farmers (information provided to the OECD by the Croatian Ministry of Agriculture).

[14] Information provided to the OECD by the Ministry of Agriculture in March 2024.

[15] The Croatian Bureau of Statistics (CBS) records lower emigration figures (a total of 350 000 between 2013-21). However, CBS numbers are based on de-registrations and are thus likely to substantially underestimate emigration figures: in practice, people often do not de-register before leaving the country (OECD, 2025[5]).

[16] Note that a positive opinion from the CES does not mean that a work permit will be granted, as additional tests by the Ministry of the Interior must be conducted as a next step.

[17] Conventional measures of international trade not always reflect the flows of goods and services within global production chains. The TiVA approach better reflects the significantly higher contribution made by services in GVCs, the role of imports in export performance, and the true nature of economic interdependencies.

[18] Note that foreign value added of the agriculture or food sectors may be embodied in imports of other industries.

[19] This phenomenon describes the trend of manufacturing sectors increasingly relying on services, whether as inputs, as activities within firms or as output sold bundled with goods. It relates to GVCs, as services are often deployed through international production networks (Miroudot and Cadestin, 2017[78]).

2 Trends and evaluation of agricultural policies

Croatia's post-independence path entailed significant changes to its laws, policies, and policy paradigms. Current agricultural policies are to a large extent decided at the EU level and governed by the Common Agricultural Policy, with some space available to adapt the CAP to its national needs and priorities. This chapter outlines the institutional framework governing the agro-food sector and reviews the evolution of Croatia's agricultural policies, from the period following independence to the current implementation of the 2023-27 CAP. Beyond the CAP, it addresses other policies financed with EU and national funds. The chapter also examines relevant trade policies.

Key messages

- Following Croatia's integration into the European Union in 2013, its agricultural policies are mostly determined at the EU level. Croatia uses the space provided by the implementation options of the Common Agricultural Policy (CAP) and the greater flexibility of the 2023-27 CAP Strategic Plan to adapt EU policy to its needs and priorities.
- In its new CAP Strategic Plan, Croatia has allocated a relatively high share of funds to a payment that seeks a redistribution from large farms to small and middle-sized farms. Direct payments and rural development interventions designed to attract young people to the sector remain important. Coupled support, in particular to livestock sectors, will also continue up to the maximum share allowed by EU rules. Agricultural risk management focuses on the provision of insurance subsidies.
- Croatia uses its national budget to co-finance CAP rural development measures and to fund state aid programmes, including additional coupled support to sensitive sectors – dairy cows, breeding sows, sugar beet, tobacco, and olive oil − and measures that preserve indigenous breeds.
- The EU-funded Recovery and Resilience Plan, approved in 2021, is not sector-specific but also finances investments in agriculture and food to improve logistics, increase land consolidation, monitor soils, improve digitalisation, and reduce food waste.
- The processes to lease and sell state-owned agricultural land are slow and the legal framework changes frequently. This creates uncertainty for farmers and could hinder land ownership by young farmers, in turn affecting their access to finance. The most recent legal reform has sought to speed up processes to dispose of this land.
- Promoting competitiveness and increasing market diversification are important national objectives. There is no specific export promotion strategy for the agro-food sector, and different public and private actors perform trade promotion activities.

2.1. Evolution of the agricultural policy framework

Over the more than three decades since its declaration of independence, Croatia has successfully transitioned to a stable market-based economy that is well integrated in the international arena. This process has been characterised by important institutional reforms and by a significant evolution of policies in all areas. The 2003 application to join the European Union (EU) marked the start of convergence towards the EU framework, with the definitive adoption of EU policies and legislation upon its accession in 2013. This process has shaped Croatia's economic development, institutional framework and policymaking (OECD, 2019[1]).

2.1.1. Policies in the first years of independence

Agricultural policy paradigms changed rapidly after independence, with Croatia prioritising market liberalisation and closer ties with the European Union

Prior to Croatia's independence, agricultural policy in Yugoslavia was characterised by central plans that set targets for agricultural production. There were stark differences between socialised enterprises practising large-scale farming and peasant holdings (see also Section 1.2.4), and the plans promoted contracts between peasants and the socialised sector aiming to foster the growth of peasant agriculture.

Policy instruments included guaranteed and minimum prices, state interventions in the domestic market, and engagement in foreign trade, as well as import quotas and, in some cases, export bans to safeguard domestic supplies (OECD, 1973[2]).

Following independence, Croatia started to develop its own agricultural policy. The transition to a market economy involved reorganising the agricultural production structure and changing the country's development focus (ARCOTRASS Consortium, 2006[3]). Initially, most measures were taken over from Yugoslav legislation. The war of independence constrained government action and its focus on agriculture, caused extensive damage to natural resources and infrastructure, in addition to driving the population away from valuable agricultural areas (Franić and Ljubaj, 2015[4]). Key milestones include the establishment of a public agricultural advisory service in 1991 (Box 4.1) and the adoption of the Development Strategy for Croatian Agriculture in 1995.

Policies included guaranteed prices for wheat, sugar beet, sunflower, soybeans, rapeseed, and tobacco, and special import levies on numerous agricultural and food products. Croatia granted production subsidies for livestock (especially cattle) and crops (in particular tobacco and sugar beet), as well as input subsidies for mineral fertilisers and certified seeds (World Trade Organization, 1996[5]).

Accession to the World Trade Organization (WTO) in 2000 required intensified market liberalisation and aligning domestic legislation with WTO agreements. Reforms included increased allocations to "Green Box" support measures (with less trade-distorting effects), the introduction of area payments for crops and of payments per head in livestock production, and the provision of investment aids for vineyards and orchards. In addition, special import levies and input subsidies were abolished, and guaranteed prices reduced with the objective of abolition[1] (World Trade Organization, 2000[6]).

Integration into the European Union in 2013 also implied a process of alignment with the EU legal framework. This convergence was supported by financial assistance from various instruments (Box 2.1).

Box 2.1. EU support for pre-accession in Croatia

Despite implementation difficulties, EU funds reached end-beneficiaries and had an impact

Croatia's pre-accession was supported by several EU assistance instruments. Initially, they operated separately: the Community Assistance for Reconstruction, Development and Stabilisation programme (CARDS) for the Western Balkan region, the Programme of Community Aid to the countries of Central and Eastern Europe (PHARE), the Instrument for Structural Policies for Pre-Accession (ISPA), and the Special Accession Programme for Rural Development (SAPARD). In 2007, these were replaced by the Instrument for Pre-Accession Assistance (IPA) (European Commission, n.d.[7]). In agriculture and rural development, Croatia received funds from SAPARD in 2005-06 and from IPARD (the rural development component of IPA) in 2007-13.

SAPARD (active from 2000-06) sought to help candidate countries implement the Common Agricultural Policy (CAP) and related policies, and to assist in the transformation of their agriculture to prepare for integration into the European Union. Each country was invited to formulate a National Agriculture and Rural Development Plan (the "SAPARD Programme"), selecting from 15 measures. As Croatia had a much shorter implementation period than Romania and Bulgaria, it focused only on two of these measures: investments in agricultural holdings, and improving the processing and marketing of agricultural and fishery products. The public expenditure allocation for Croatia under SAPARD (EUR 33 million) was much smaller than for Romania (EUR 1.5 billion) and Bulgaria (EUR 722 million). The *ex post* evaluation of SAPARD indicates that the rate of absorption of EU funds in Croatia was low (56%), as was the percentage of projects actually implemented (22%) (Sanopoulos et al., 2013[8]).

IPARD was active from 2007-13. Croatia's programme included three priority axes: (i) improving market efficiency and the implementation of Community standards, (ii) preparatory actions for the implementation of agri-environmental measures and local strategies for rural development, and (iii) development of the rural economy. The total budget was EUR 162 million, with 75% funded by the European Union. According to its *ex post* evaluation, IPARD was moderately successful in the use of funds and the measures' effectiveness. Reasons for this limited success include the late start of the implementation and a lack of capacity of the implementing institutions and the users (KPMG Croatia, 2017[9]). The situation was aggravated by the recession that affected Croatia during this period.

Despite the modest results in terms of use of the funds and project implementation, a firm-level analysis of the impact of SAPARD and IPARD grants to modernise and improve production capacities found that these grants had a positive effect on short- and medium-term indicators of growth and business performance of the beneficiary companies (Kukoč, Škrinjarić and Juračak, 2021[10]).

2.1.2. Start of convergence with EU policies and pre-accession

Alignment with EU policies started with legal reforms and changes to support policies...

The Law on Agricultural Land and the Law on Agriculture – both from 2001 − marked the first steps towards harmonisation with EU policy (Franić and Mikuš, 2013[11]). Further developments included the 2002 adoption of a strategy for agriculture and fisheries that widened the focus to rural development. Croatia's policies also started placing more emphasis on food safety and organic farming (Mikuš, 2014[12]).

Support to the sector was gradually aligned with EU policies. After 2000, Croatia introduced new models of support, such as decoupled direct payments (World Trade Organization, 2010[13]). Other noteworthy reforms include the creation of the Farm Register in 2002 − with registration as the first requirement for farmers to obtain state aid − and the 2009 adoption of the Act on State Support in Agriculture and Rural Development that sought to gradually harmonise the system of direct payments with the EU Single Payment Scheme (Mikuš, 2014[12]). In line with the EU Common Agricultural policy (CAP), the 2009 Act also differentiated between direct payments and rural development support and between basic area-based payments and coupled payments (Franić and Ljubaj, 2015[4]).

Coupled direct payments, which had played an important role in previous years, decreased between 2006 and 2012, although they remained in place for sensitive sectors. Basic flat rate area payments for agricultural land were introduced in 2009, and payments in line with the EU Single Payment Scheme in 2012 (Mikuš, 2013[14]). Expenditures for rural development and for general services also increased, as did their share in total budgetary transfers (Mikuš, 2014[12]).

...and continued by incorporating the rural development dimension

The EU accession negotiations marked a period of "learning about rural development". The scope of agricultural policies broadened to include the overall development of the rural economy, a process that was supported by the SAPARD and IPARD programmes (Franić and Ljubaj, 2015[4]). In 2008, Croatia adopted a Rural Development Strategy for 2008-13 in line with the CAP. However, the implementation of the intended policy reforms and their communication to users were limited with the result that Croatia's agricultural policy measures remained focused on direct payments (Franić and Mikuš, 2013[11]).

Despite these limitations, rural development initiatives by local actors increased as they became familiar with the EU's LEADER approach.[2] In this context, the Croatian Network for Rural Development was established in 2007 with the purpose of connecting civil society organisations to collaborate and share knowledge that would improve life in rural areas (Croatian Network for Rural Development, 2024[15]). The first Local Action Group (LAG Gorski Kotar) was formed in 2008. Croatian stakeholders recognise the

importance of rural development. Indeed, 90% of Croatian respondents to a survey on the development of the European Union's rural vision towards 2040[3] supported consideration of the needs of rural areas in the EU's public spending decisions, as opposed to 79% at the EU level (European Commission, 2021[16]).

2.1.3. Institutional framework for agricultural policy management

The governance around the agro-food sector has changed in recent years

The institutions in charge of implementing policies related to agriculture and food have changed in recent years as a result of Croatia's EU membership, the evolution of policy focus areas, and the reorganisation and consolidation of domestic agencies.

The main governing authority of the sector is the Ministry of Agriculture,[4] which is responsible for agriculture (including support to agriculture and the organisation of agricultural markets), fisheries, forestry, rural development, and agricultural land. It is also in charge of sanitary and phytosanitary policy, including plant varieties, plant health, the use of pesticides and fertilisers or the prevention, detection and control of animal diseases and zoonoses. Furthermore, the ministry is also responsible for food safety and hygiene, food quality and labelling, animal feed, reduction of food waste and loss, and quality systems for agricultural and food products, among others.

EU regulations require that Member States establish paying agencies responsible for the management and control of expenditures from the CAP funds (European Commission, n.d.[17]). In Croatia, the Paying Agency in Agriculture, Fisheries and Rural Development (*Agencija za plaćanja u poljoprivredi, ribarstvu i ruralnom razvoju* - APPRRR) was established in 2009 during the pre-accession phase. APPRRR is a public body in charge of the implementation of the CAP and the EU Common Fisheries Policy, and of national programmes and measures. The work of APPRRR is supervised by an Administrative Council presided by the Minister of Agriculture and including representatives of the Ministry of Finance and the Ministry of Regional Development and EU Funds.[5]

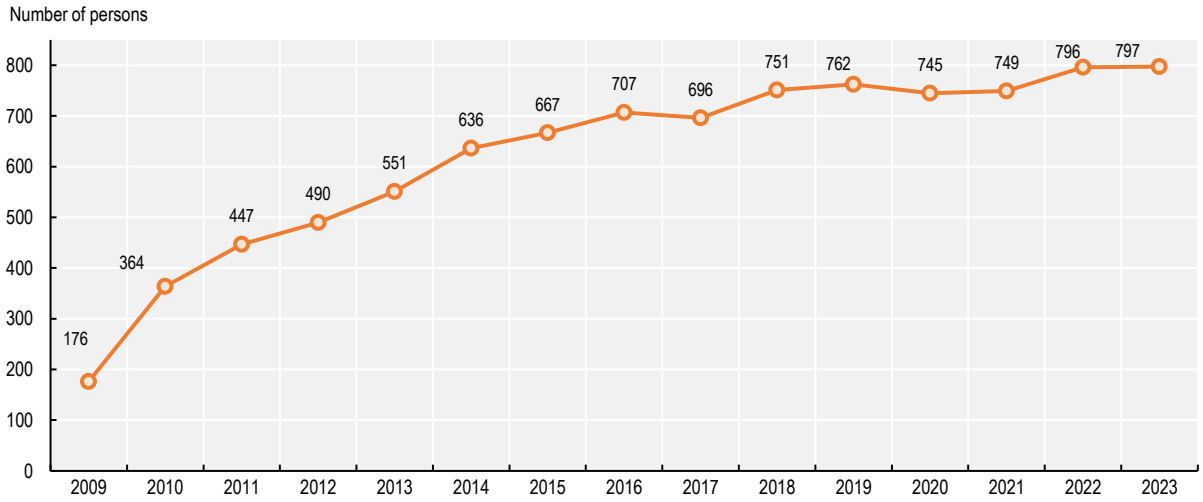
In addition to executing the payments, APPRRR must verify that beneficiaries comply with all rules and requirements, including those established under the CAP's cross-compliance (Section 2.2.2). The agency is in charge of managing the Farm Register, the AGRONET electronic system for processing subsidy applications[6] and other registries and databases, including ARKOD (the system for digital identification of land parcels). It also has responsibilities in the area of international trade, such as issuing import and export licences (see also Section 2.6.2).

In view of the growing importance of EU policy in Croatia, the increasing complexity of the conditions and requirements for CAP payments and the expansion of its responsibilities, operating APPRRR requires more staff. As of October 2023, the agency had 797 employees, a four-fold increase from 2009, the agency's first year of operation (Figure 2.1). As a comparison, the total staff employed by the Ministry of Agriculture in October 2023 was 858.

The Croatian Agency for Agriculture and Food (*Hrvatska agencija za poljoprivredu i hranu* - HAPIH)[7] is a specialised public institution that gives professional and scientific support to the Ministry of Agriculture in areas such as drafting legislation and providing expert opinions. It also participates in the implementation of official controls and other activities related to food, animal feed, animal health and welfare, plant health, and plant protection. HAPIH is the national contact point of the European Food Safety Agency (EFSA), ensuring the co-ordination of the national network of institutions in the fields of food safety and animal feed. It started operating in January 2019, taking over most staff and responsibilities of previously existing agencies including the Croatian Food Agency (HAH) and the Croatian Agricultural Agency (HAP) (Croatian Parliament, 2018[18]).

Figure 2.1. The responsibilities of APPRRR demand a growing number of staff

Evolution of staff of the Paying Agency for Agriculture, Fisheries and Rural Development, 2009-2023



Note: The number for 2023 corresponds to staff employed as of mid-October.
Source: Authors, with information provided by the Croatian Ministry of Agriculture.

The State Inspectorate[8] (*Državni inspektorat*) is responsible for inspection and official controls in many areas, including food safety and sanitary and phytosanitary inspections. There were several legal reforms and institutional reorganisations in this area. A State Inspectorate was created in 1997 to put under a single umbrella the responsibilities of numerous separate inspectorates beyond agro-food. However, in 2014 it was abolished, and inspection functions were returned to separate authorities, including the Ministry of Agriculture. A 2018 legal reform unified again the inspection services and re-established the State Inspectorate in its current form. The new institution started working in April 2019 (OECD, 2019[1]).

Other institutions with competences relevant to the sector include the Ministry of Health (aspects related to food safety and the protection of human health), the Ministry of Economy and Sustainable Development (environmental policies), the Ministry of Foreign and European Affairs (export promotion), the Agency for the Protection of Market Competition (competition in the domestic market), the Croatian Accreditation Agency (technical regulations) and the Croatian Bureau of Statistics (national statistics including the Agricultural Census). Section 2.6.2 details the institutional arrangements for trade policy.

2.1.4. The strategic vision and priorities for Croatia's agriculture and food

The government and stakeholders developed a strategic vision for the sector

Croatia's agricultural policy is based on the CAP objectives along with other EU and international commitments and domestic priorities. Two recent strategic exercises helped define the priorities of its food system: the CAP Strategic Plan for 2023-27 (Section 2.3) and a national Agricultural Strategy up to 2030 ("the 2030 Strategy"), adopted in February 2022. For the definition of the 2030 Strategy, the government and agro-food sector representatives agreed on a vision of agricultural development that seeks to "produce a larger quantity of high-quality food at competitive prices, sustainably manage natural resources while increasing resistance to climate change, and contribute to improving the quality of life and increasing employment in rural areas" (Croatian Parliament, 2022[19]).

The 2030 Strategy sets the framework for interventions financed by the 2023-27 CAP and state, regional and local budgets. It has four strategic goals: increasing the productivity and competitiveness of the

agricultural and food sector; strengthening the sustainability and resilience of agricultural production to climate change; renewing the rural economy and improving living conditions in rural areas; and encouraging innovation in the sector. The sector's strategic goals and needs, and the necessary interventions to achieve them, were determined based on analysis and stakeholder consultations. The Strategy considers the direction given at the EU level by plans such as the European Green Deal, the Farm to Fork Strategy and the Biodiversity Strategy, as well as the national strategies and goals in areas such as climate change.

Other national plans and strategies that are relevant to the sector include the Low-Carbon Development Strategy, the Strategy for Adaptation to Climate Change, the Nature Protection Strategy and Action Plan, the Plan for Prevention and Reduction of Food Waste, and the National Action Plan for the Development of Organic Agriculture. Relevant documents will be assessed in the following chapters.

2.2. Post-accession and implementation of the CAP 2014-22

2.2.1. Adoption of the EU Common Agricultural Policy

The Treaty of Accession signed in December 2011 paved the way for Croatia to become a member of the European Union as of July 2013. As for other EU Member States, the policy setting affecting the agricultural sector since the date of accession has been driven by the Common Agricultural Policy (CAP) (Box 2.2). Croatia adopted all EU policies of relevance to the sector, including the common trade policy. In some cases, transitional provisions were established to allow for a gradual implementation of measures.

Box 2.2. The EU Common Agricultural Policy

The CAP is the first common policy adopted by the European Union under the Treaty establishing the European Economic Community (the Treaty of Rome) in 1957. It is based on three principles: a common market, community preference and financial solidarity. Its objectives, set out in Article 39 of the Treaty on the Functioning of the European Union, are to increase agricultural productivity by promoting technical progress, and thus to ensure a fair standard of living for the agricultural population; to stabilise markets; to ensure the availability of supplies; and to ensure that supplies reach consumers at reasonable prices. While these principles have not changed in over 60 years, in practice the CAP now addresses additional objectives such as the environment, climate change, rural development, and animal welfare.

The CAP is composed of two pillars, with two separate funding sources.

- Pillar 1 is funded by the European Agricultural Guarantee Fund (EAGF). It defines and funds direct payments to farmers and market measures under the Common Market Organisation. Direct payments are largely decoupled from production and make up the bulk of CAP spending: in 2022, they accounted for two-thirds of the CAP expenditures (OECD, 2023[20]). Market support measures cover mainly the fruit and vegetables and wine sectors, while other market-related expenditures support the European Union's outermost regions or fund the promotion of agricultural products, apiculture, and the distribution of milk, fruit and vegetables in schools.
- Pillar 2, or Rural Development Regulation, is co-funded by the European Agricultural Fund for Rural Development (EAFRD) and Member States' national budgets. Pillar 2 contains measures such as agri-environmental schemes, payments to areas with natural constraints, rural development, investment assistance, and the LEADER approach. EAFRD is part of the EU-level Common Strategic Framework covering all support from European Structural and Investment (ESI) funds in Member States through partnership agreements.

In 2023, the OECD reviewed the European Union's policies for the sector over the period 2014-22, including the CAP, and made recommendations that can be applied either during the current programming period 2023-27 or in the next programming period. The key messages of this 2023 review are presented in Box 2.3.

Box 2.3. Policies for the Future of Farming and Food in the European Union: Key messages

- The European Union's diverse agro-food sector is at a critical juncture, confronting climate change and successive crises such as the systemic shock of the COVID-19 pandemic and the war in Ukraine, while addressing the triple challenge facing food systems: ensuring food security and nutrition, providing livelihoods for actors in the food chain, and improving environmental sustainability.
- Through the OECD's Agro-Food Productivity-Sustainability-Resilience lens, this review, which draws lessons from the period 2014-22, shows that, in this ever-changing economic and policy environment, the EU agro-food system has demonstrated its resilience and has been able to keep productivity growing, in particular in post-2004 Member States, to reduce GHG emissions intensity, and to foster cross-country collaboration on innovation.
- However, in recent years, agricultural productivity has increased at a slower pace than in other OECD countries, while the environmental sustainability performance of the sector has not improved in line with expectations. This stalled progress is not due to insufficient ambition or lack of resources, but rather to policy design and implementation.
- The Common Agricultural Policy (CAP) 2023-27, which represents about one-third of the EU budget, includes promising new approaches and priorities. The CAP is considered strategic for the European Green Deal (EGD) agenda due to its potential for addressing environmental concerns, and is increasingly expected to deliver on broad food systems objectives that go beyond the agricultural sector.
- The transition of the EU food systems calls for an overall transformation, where innovation will play a critical role in delivering sustainable productivity growth. Meeting the ambitious EGD objectives will require further reform, by redesigning payments, regulations, innovation and data strategies, as well as adopting new approaches to deliver environmental services.
  - **Payments**. Further redesign CAP payments into separate measures targeted at income support and environmental sustainability and align the CAP expenditures with environmental and climate priorities. Introduce specific mechanisms to incentivise performance by Member States, reduce total spending on decoupled income payments and phase out coupled support.
  - **Regulations**. Address the implementation gap on sustainability objectives, enhance regulatory design and overcome potential barriers that hamper innovation. o Innovation. Bring innovation to the centre of EU agricultural policy strategy to ensure that it effectively helps the sector to become more productive, sustainable and resilient.
  - **Data**. Strengthen the EU agro-food data strategy and enhance digitalisation to monitor policies, create awareness, facilitate knowledge exchanges and find innovative solutions.
  - **Environmental service**s. Advance in the adoption of result-based multi-annual payments and collective action for environmental services when possible, and introduce reporting on results.

Source: OECD (2023[21]).

Croatia started to implement the CAP at a time of reform

The timing of Croatia's EU accession required the adoption of the Common Agricultural Policy (CAP) just when its 2013 reform started to be implemented. The 2014-22 CAP was effective as of 1 January 2014 and remained in force until 31 December 2022 (as a transitional period for the post-2020 reform). Its most important feature was the conversion of decoupled aid into a new system with aid for specific objectives. The new system of direct payments comprised seven components: (1) a basic payment; (2) a greening payment for environmental public goods; (3) an additional payment for young farmers; (4) a "redistributive" payment for the first hectares of farmland; (5) support for areas with specific natural constraints; (6) aid coupled to production; and (7) a simplified system for small farmers (OECD, 2023[20]). The 2013 reform also featured a more integrated, targeted and territorial approach to Pillar 2 through rural development plans, simplifying the range of available instruments to focus on core objectives. The Common Market Organisation tools were consolidated into safety nets in case of market disruption or price crisis, with other supply control measures (the milk and sugar production quotas) ending in 2015 and 2017, respectively.

Under the 2014-22 CAP, EU Member States had several options for implementing the rules at the national level. They could decide whether to transfer funds between the two pillars and had specific choices for each one. In Pillar 1 the options included the use of the redistributive payment for the first hectares of the farm, the share of funds dedicated to the payment for young farmers, and the use of coupled payments. For Pillar 2, they could choose to implement the Rural Development Plan at the national or regional level and could select among 20 possible measures across six priority areas. One of these measures (M18) was specific to Croatia to finance complementary national direct payments. Two new measures were added after 2020 to grant exceptional temporary EAFRD support in response to the COVID-19 pandemic (M21) and in response to the war in Ukraine (M22).

Croatia is a relatively small recipient of the EU's CAP funds. As an example, in 2020 it received only 1.1% of the overall CAP expenditure (including direct payments, market measures and rural development support), which placed it twenty-first among the 27 EU Member States in terms of the support received (European Commission, 2021[22]). Nevertheless, this amount represented 39% of Croatia's gross agricultural value added in the same year, well above the EU average of 25%.[9]

The initial EU budget for the 2014-22 CAP in Croatia was EUR 3.4 billion, distributed in EUR 1.07 billion for Pillar 1 (31%, close to the EU average of 28.5%) and EUR 2.33 billion for Pillar 2 (69%) (European Commission, 2016[23]). The relatively low size of Pillar 1 is due to the gradual introduction of direct payments, and the Pillar 2 allocation increased in the years that followed (see below). Croatia chose flexibility between pillars, transferring 15% of its Pillar 2 budget to Pillar 1. This transfer from rural development to direct payments was also made by four other EU Member States.[10] The transfer reduced the national agriculture budget for Croatia as funds moved to Pillar 1 have no national co-financing requirement (World Bank, 2019[24]).

2.2.2. Implementation of Pillar 1 measures

CAP direct payments were introduced gradually, with limited complementary payments from national funds

Like other newly acceded EU Member States, Croatia introduced direct payments over a phasing-in period. As set out in the Treaty of Accession, 25% of the applicable level of direct payments was introduced in 2013. This percentage increased by 5% in 2014 and 2015, and by 10% each year thereafter, up to 100% in 2022. During this ten-year period, Croatia was allowed to top up to 100% of the applicable level by using a combination of national and EAFRD funds (through measure M18). These complementary national direct payments (CNDP) were subject to a ceiling. In practice, Croatia only granted CNDP between 2015 and

2017 and, due to budgetary constraints, limited the payments to an average of two-thirds of the possible ceiling (World Bank, 2019[24]).

Given the presence of landmines from the armed conflict of the 1990s (see also Box 1.2), Croatia was allowed to establish a special national de-mining reserve for ten years to allocate payment entitlements to farmers on the basis of land that was de-mined and returned to agriculture. This reserve was subject to the same phase-in schedule as the direct payments, with the maximum amount of EUR 9.6 million reached in 2022. Croatia committed to notify the Commission annually the eligible land area, the budgetary envelopes, and the unused amounts.

With the CAP, Croatia adopted cross-compliance, which aims to ensure that beneficiaries implement mandatory standards and requirements. Cross-compliance is designed to raise awareness by beneficiaries of their obligations under statutory management requirements (SMRs), which are based on EU legislation that all farmers must respect regardless of whether they receive CAP support. It also ties direct payments and some rural development and sectoral payments to compliance with standards of Good Agricultural and Environmental Condition (GAEC), which relate to the environment, food safety, animal and plant health, animal welfare, and to maintaining agricultural land in good agricultural and environmental condition (OECD, 2023[21]). Seven GAEC standards and 13 SMRs were applicable for the 2014-22 CAP. All Member States were obliged to implement cross-compliance, but had flexibility in their design in order to adapt them to local situations.

The payment for young farmers stands out for its high uptake

Unlike other new EU Member States, Croatia opted to directly apply the regular Single Payment Scheme instead of the simplified transitional Single Area Payment Scheme (SAPS). Given the large number of small farms (Chapter 1), the minimum farm area threshold for receiving direct payments was set at one hectare.

Croatia chose to apply the redistributive payment, which allowed higher payments to the first hectares of the farm. It did not use other redistribution options such as capping payments per beneficiary or applying degressivity (reducing payments that exceed a threshold). The maximum area to which the redistributive payment applied could vary by country. Croatia granted this payment to the first 20 hectares of each holding. The redistributive payment represented around 30% of the total decoupled payments that eligible farmers in Croatia received between 2015 and 2021 (European Commission, 2023[25]).

The young farmer payment (YFP), additional to other direct payments for farmers of 40 years or less, was compulsory for all Member States, but they could decide whether to allocate it 2% or less of their total direct payment envelope. Croatia allocated 2% until 2015 and 1.5% afterwards (European Commission, 2016[23]). Despite the intended decrease, in 2021 it spent 2% of its direct payment envelope on the YFP, which made it the only Member State to spend the maximum share. Croatia also had the fourth-highest increase (111%) in the number of YFP beneficiaries in 2015-21. As of 2021, 10% of farmers were covered by the YFP. Even if this represents a decrease from the 12% reached in 2019 (a downward trend also observed in other Member States), Croatia had the third-highest share of YFP coverage in the European Union, after Greece and the Netherlands (European Commission, 2023[25]).

Croatia was among 15 Member States that applied the small farmers scheme (SFS). This system offered farmers the option of a single annual payment of up to EUR 1 250 instead of different components and was subject to simplified administrative procedures and an exemption from greening obligations and cross-compliance penalties. In Croatia, farmers were automatically included in the SFS if they were entitled to less than EUR 657 in basic payments. In 2021, this scheme covered 8% of all farmers that applied for decoupled payments in Croatia (European Commission, 2023[25]).

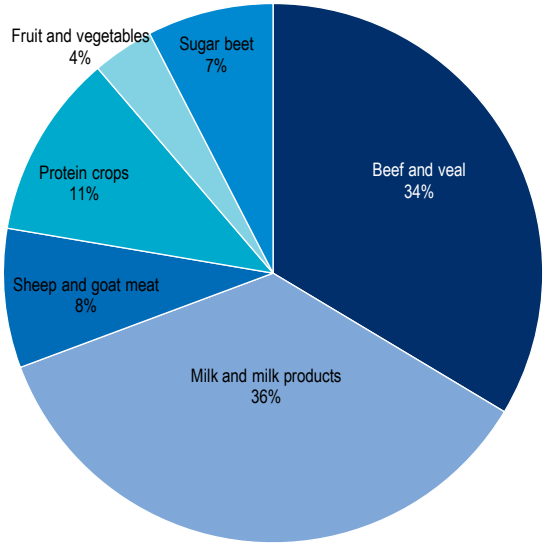
Member States had to earmark 30% of their direct payment envelope for a “greening” payment to support farmers to adopt or maintain practices deemed to contribute to the European Union’s environmental and

climate goals. The three mandatory practices entail crop diversification, maintaining permanent grassland, and dedicating 5% of arable land to Ecological Focus Areas to improve biodiversity. Member States had the flexibility to allow farmers to meet the requirements through equivalent practices. Croatia selected to implement greening as an individual payment per beneficiary instead of a flat rate per hectare. It also chose not to use equivalent practices.

Member States could allocate up to 13% of their direct payment envelope to voluntary coupled support (VCS). This could be increased by an additional 2% earmarked for protein crops. VCS is granted to sectors or regions facing difficulties, and under production-limiting conditions (based on fixed areas and yields or number of animals and subject to a financial ceiling). Croatia allocated the maximum 15% to VCS. The sectors covered were beef and veal, milk and milk products, protein crops, sugar beet, sheep meat and goat meat, and fruit and vegetables. VCS payments by Croatia reached EUR 52 million in 2021, with the largest share going to the milk and dairy sector (Figure 2.2).

Figure 2.2. Most coupled support went to dairy and bovine livestock farms

Distribution by sector of coupled support paid under the CAP VCS, 2021

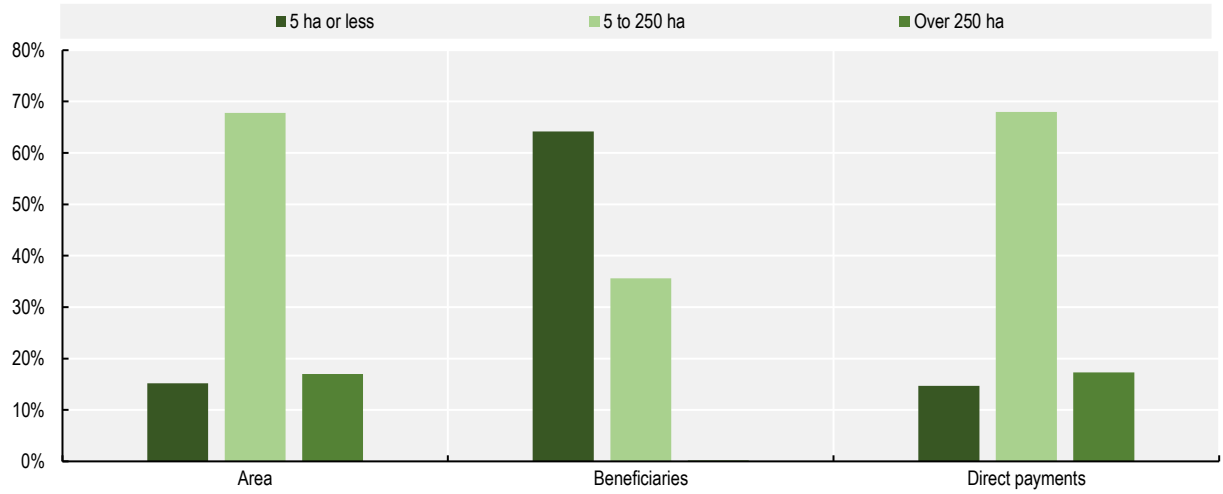


Note: This does not include coupled support granted from Croatia's State budget.
Source: European Commission (2023). Summary report on the implementation of direct payments (except greening) 2021, https://agriculture.ec.europa.eu/system/files/2023-06/summary-report-implementation-direct-payements-claim-2021_en.pdf.

Unlike the overall EU trend, the number of beneficiaries of direct payments in Croatia increased over the period 2014 to 2021 (European Commission, 2022[26]). Despite the high share of redistributive payments in Croatia, as CAP Pillar 1 payments are largely area-based, in 2021 small farms (which represent almost two-thirds of support beneficiaries) received less than 15% of payments, while the largest farms held 17% of the area and received a similar share of payments (Figure 2.3).

Figure 2.3. Most direct payments went to medium and large farms

Share of direct payment beneficiaries, area and payment by farm size, 2021



Note: Farms of over 250 ha represented 0.2% of the beneficiaries.
Source: European Commission (2022[26]).

2.2.3. The Rural Development Programme 2014-22

The largest share of rural development funds supported investments in physical assets

Croatia's Rural Development Programme (RDP) for the period 2014-22 was adopted in May 2015. Its main objective was to restructure and modernise the farm and food sectors. The RDP initially envisaged EUR 2.3 billion of public funding, consisting of EUR 2 billion EAFRD funds and EUR 0.3 billion national funds. This was later amended and increased, including through the additional EAFRD funds made available to address the challenges brought by the COVID-19 pandemic and the war in Ukraine. The Croatian RDP was last amended in February 2022 (European Commission, 2023[27]). The final resource allocation was EUR 3.3 billion, consisting of EUR 2.8 billion EAFRD funds (86% of EU co-financing) and EUR 0.5 billion national funds (European Commission, 2024[28]).

Croatia offered all twenty measures available, as well as the measures to respond to the COVID-19 pandemic and the war in Ukraine (M21 and M22). The three measures with the largest budget allocations were M4 (Investments in physical assets) with a total public funding (including EU and national) of EUR 986 million, M13 (Payments to areas with natural or other constraints) with EUR 437 million and M7 (Basic services and village renewal in rural areas) with EU 392 million. By the end of 2023, 90% of the allocations of the 2014-22 RDP had been decided and 83% spent (European Commission, 2024[29]). This puts Croatia in the middle of Member States regarding the absorption of rural development funds, just over the EU average of 82%.

There were variations in the national-level uptake of RDP measures (Table 2.1). This can be partly explained by the fact that Croatia was implementing the RDP for the first time, with experience from pre-accession limited to a few measures (World Bank, 2019[24]). Measures with environmental and climate purposes, such as agri-environmental programmes, support to organic farming and to animal welfare practices, were fully utilised, as were the funds for risk management funds (mainly insurance subsidies, see also Section 2.5). However, some measures, including those related to innovation (M1 on knowledge transfer and M16 on co-operation) had a low share of use of the initially budgeted funding (see

Section 4.3.1 for a more detailed discussion). This is also the case for measures aimed at improving participation in quality schemes and to foster producer groups and organisations.

Table 2.1. The utilisation of rural development measures diverged

Detail of planned and effective expenditure per measure in Croatia's RDP, 2023 (EUR million)

Measure		Total public funding (EU and national)		
		Planned	Spent	Share spent
M01	Knowledge	6.3	4.0	64%
M02	Advisory services	13.9	7.7	55%
M03	Quality schemes	3.2	0.2	7%
M04	Physical Investment	985.7	666.3	68%
M05	Restoring agricultural potential	86.6	78.8	91%
M06	Farm and business development	278.5	251.2	90%
M07	Basic services	392.2	337.4	86%
M08	Forest	124.9	52.9	42%
M09	Producer groups / organisations	6.3	2.0	32%
M10	Agri-environment and climate	135.7	157.0	116%
M11	Organic farming	244.8	248.1	101%
M13	Areas with natural constraints	437.3	420.6	96%
M14	Animal welfare	76.6	88.7	116%
M16	Cooperation	5.2	1.0	20%
M17	Risk management	109.3	115.4	106%
M18	National payments Croatia	135.1	135.1	100%
M19	LEADER and CLLD	97.8	74.5	76%
M20	Technical assistance	85.1	69.9	82%
M21	COVID-19 crisis (from 2020)	26.4	26.4	100%
M22	Impact of Russia's invasion of Ukraine (from 2022)	31.9	0.0	0%*
Total RDP funding		**3 282.5**	**2 737.4**	**83%**

Note: "Planned" refers to the total amount allocated, and "spent" is the total expenditure eligible for reimbursement, as reported by the beneficiary projects and transmitted by the programmes to the European Commission. *According to the Ministry of Agriculture of Croatia, the full amount for M22 had been paid by end-2023. However, this amount was not yet reflected in the EU database at the time of consultation.
Source: European Commission (2024). ESIF 2014-2020 Finance Implementation Details [Database], https://cohesiondata.ec.europa.eu/2014-2020-Finances/ESIF-2014-2020-Finance-Implementation-Details/99js-gm52 (accessed in February 2024).

2.3. The CAP 2023-27

2.3.1. The new CAP delivery model

The new CAP gives Member States more space to focus on their priorities

The 2023-27 CAP entered into force in January 2023. It is built around ten specific objectives for social, environmental, and economic sustainability: ensuring a fair income for farmers; increasing competitiveness; improving farmers' position in the food chain; climate change action; environmental care; preserving landscapes and biodiversity; supporting generational renewal; promoting vibrant rural areas; protecting food and health quality; and a cross-cutting objective of fostering knowledge and innovation.

This CAP introduced a new delivery model, with more flexibility for Member States. Specifically, Member States design and implement CAP Strategic Plans (CSPs) that define funding allocation for income support, market measures and rural development in line with broad policy measures provided by the European Commission that can be shaped to national needs and capabilities (European Commission,

n.d.[30]). The CSPs are based on an analysis of the strengths, weaknesses, opportunities, and threats (SWOT) of Member States' agro-food sectors and provide more space for them to target interventions and adjust the common policy to their needs.

The CSPs apply to both pillars of the CAP. Unlike the previous CAP, in which Member States implemented 118 Rural Development Programmes that included regional plans in several countries (e.g. France, Germany, Italy, and Spain), there is a single CSP for each Member State (except for Wallonia and Flanders in Belgium) for a total of 28 CSPs in the European Union.

In this CAP, environmental sustainability is addressed through a new "green architecture". Greening payments were replaced by "enhanced conditionality" with stricter environmental cross-compliance requirements and by new voluntary eco-schemes. Eco-schemes (Box 2.4) are payments per hectare to farmers that, on a voluntary basis, implement in a given plot of their farm some determined additional management practices (OECD, 2023[31]). They must be designed by all Member States and should account for at least 25% of direct payments (although some derogations to this rule apply). Social sustainability is incorporated through provisions to improve inclusiveness − such as support for small farmers and income redistribution – address food security and support rural communities (European Commission, n.d.[32]).

Box 2.4. Eco-schemes in the CAP 2023-27

This new instrument seeks to support a transition towards more sustainable farming

Eco-schemes are a new element to promote environmental sustainability in the CAP. They use Pillar 1 funds to reward farmers who manage land in a nature- and climate-friendly way beyond the cross-compliance requirements. Their implementation is voluntary for farmers. Each eco-scheme designed by a Member State must cover at least two of the following areas of action: climate change mitigation, climate change adaptation, water protection, soil protection, protection of biodiversity, sustainable and reduced use of pesticides, enhance animal welfare or combat anti-microbial resistance.

Member States may adapt eco-schemes to their national needs. They can be used to support practices such as organic farming, agro-ecological practices, precision farming, agro-forestry or carbon farming, and animal welfare improvements (European Commission, n.d.[33]).

The payments are granted per hectare either as compensation for additional costs incurred or income foregone, or as fixed top-ups to decoupled direct payments. Member States developed a total of 158 eco-schemes in their CSPs. Of them, 82% provide compensation for costs or lost income and 18% are implemented as top-ups to basic income support (European Commission, 2023[34]).

Member States have used the flexibility of the new delivery model to implement a myriad of options and approaches. General trends in the choices made include an important rise in redistributive support, an increase in the share of coupled payments and numerous scopes and approaches for the eco-schemes. Support for young farmers has been generally shifted to direct payments from rural development support. There are heterogeneous approaches in the rural development interventions. Rates of national co-financing vary from as low as 12% to as high as 80%. There has also been a strengthening of environment and climate interventions, risk management tools, and LEADER (Münch et al., 2023[35]).

2.3.2. Overview of Croatia's CSP

Like in the previous CAP period, Croatia opted to transfer funds from rural development to direct payments

Croatia's CSP (known as SP ZPP, its Croatian acronym) was approved by the European Commission in October 2022. The total budget for 2023-27 is EUR 3.7 billion, with EUR 1.9 billion, or 52% of the total public funding, for Pillar 1 direct payments and sectoral interventions (including EUR 9.5 million of national co-financing for the latter). The budget for Pillar 2 is EUR 1.8 billion, or 48% of the total public funding. This is distributed in EUR 1.5 billion of EAFRD funds and EUR 352 million of national co-financing (Table 2.2). The rate of EU financing for Pillar 2 is thus 80.5%, above the EU average of 60%, placing Croatia in the group of eight Member States[11] with relatively high (80% or more) rates of EU financing for rural development (Münch et al., 2023[35]).

Member States may transfer up to 25% of their allocated funds between pillars. As in the previous period, Croatia opted to transfer funds from Pillar 2 to Pillar 1. The transfer applied to only 2% of Croatia's funding allocation (against 15% transferred in 2014-22). Five other EU Member States[12] also selected a transfer of funds in this direction.

When the distribution of public funding is compared with peer countries and the EU average, Croatia has a relatively even distribution of funds between the two pillars and a relatively high share of EAFRD funding for Pillar 2 (Figure 2.4).

Table 2.2. The CSP budget is evenly distributed between the two pillars

Structure of Croatia's CAP Strategic Plan and budget for 2023-27 (million EUR)

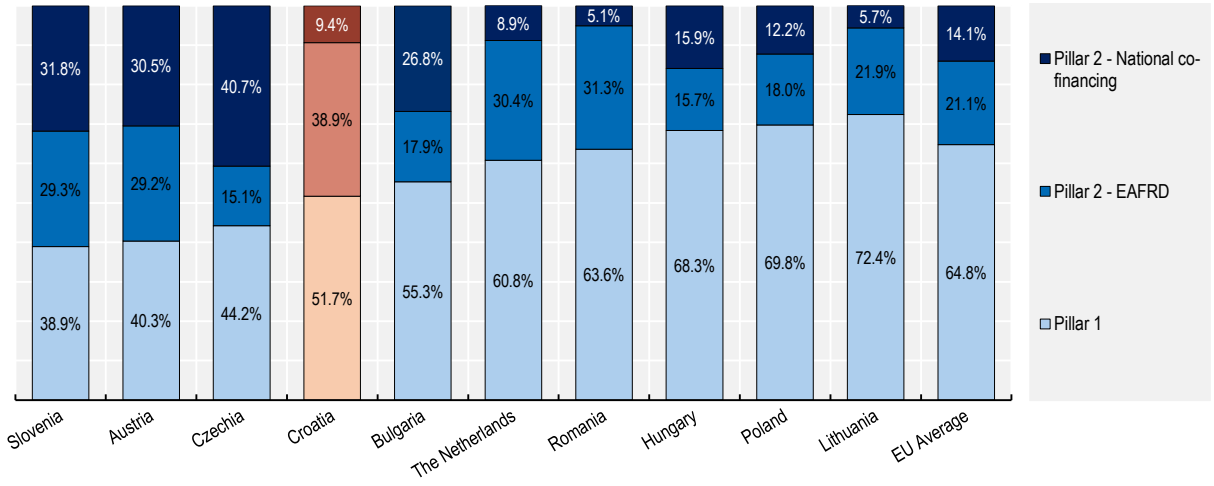
Component	Measures	Description	Budget		
Direct payments	Basic income support	Direct support to active farmers, subject to enhanced conditionality.	712.1		
	Redistributive payment	Complementary direct payment to small and medium farmers for their first 30 hectares of agricultural land.	374.8		
	Young farmers' payment	Complementary payments for farmers under 40 years of age and with a minimum training level.	37.5		
	Eco-schemes	Payments to farmers who voluntarily apply practices beyond the mandatory conditionality.	468.5		
	Coupled income support	Payments for the maintenance of a specific type of livestock or for the production of a specific crop.	281.1		
Sectoral	Interventions for fruits and vegetables, wine and apiculture.		62.5		
Total Pillar 1			**1 936.3**		
Pillar 2: Rural development programme			**Total public expenditure**	**Of which: EAFRD**	**National co-financing**
Environmental, climate-related and other management commitments (Article 70)		Agri-environmental measures, organic farming, endangered native breeds, animal welfare.	496.5	*397.2*	*99.3*
Natural or other area-specific constraints (Article 71)		Support farmers in areas with unfavorable characteristics and in isolated regions.	213.7	*170.9*	*42.7*
Area-specific disadvantages resulting from certain mandatory requirements (Article 72)		Compensation for losses resulting from restrictions associated with forest conservation requirements.	8.8	*7.1*	*1.8*

Component	Measures	Description	Budget		
Investments, including investments in irrigation (Articles 73 and 74)		Support for investments, including for a new public irrigation system.	713.3	*570.7*	*142.7*
Setting up of young and new farmers and rural business start-up (Article 75)		Lump sum payment to support establishment and implementation of a business plan.	101.5	*81.2*	*20.3*
Risk management tools (Article 76)		Support for agricultural insurance.	70.2	*56.2*	*14.0*
Cooperation (Article 77)		Support for quality systems and development of short supply chains and local markets, innovation partnerships and LEADER approach.	120.7	*96.6*	*24.1*
Knowledge exchange and information dissemination (Article 78)		Support for professional training and knowledge transfer and for agricultural advisory services.	35.3	*28.2*	*7.1*
EAFRD contribution for technical assistance (Article 94)		Up to 4% of EAFRD funding may support technical assistance at the member state's initiative for CSP administration and implementation	50.0	*50.0*	*0.0*
Total Pillar 2			**1 810.1**	**1 458.1**	**352.0**
Total Pillar 1 and 2				**3 746.4**	

Source: Ministry of Agriculture, Strategic plan of the Common Agricultural Policy 2023-2027, https://ruralnirazvoj.hr/files/Strateski-plan-Zajednicke-poljoprivredne-politike-Republike-Hrvatske-2023.-2027..pdf (accessed November 2023).

Figure 2.4. Croatia has a higher share of EAFRD funding than the EU average and amongst peer countries

Distribution of planned funding for the CAP 2023-2027, selected Member States and EU average



Note: Values expressed as a percentage of total public funding. Pillar 1 includes direct payments and sectoral interventions. Pillar 2 refers to the rural development programs and is funded through EAFRD and national co-financing.
Source: Authors, based on an analysis of Member State CSPs.

The design of the new CSP included a needs assessment performed in consultation with stakeholders and experts. Croatia identified 23 needs, which were prioritised based on the stakeholders' evaluation (Table 2.3). Of the ten needs given high priority, many are of an economic nature: improving farmers' income, productivity and competitiveness, increasing value added, creating jobs and improving access to capital. Two high-priority needs are environmental and relate to practices for climate change adaptation and mitigation and for minimising negative impacts from agriculture.

Following submission of the draft CSPs, the European Commission assessed to which extent Member States' needs were linked with interventions and adequately covered. Only Croatia and France were found to have addressed 100% of their needs across all CAP objectives (Münch et al., 2023[35]).

Table 2.3. Many of Croatia's high-priority needs are of an economic nature

Needs assessment and prioritisation in the Croatian CSP

CAP Strategic Objective	Needs identified	Prioritisation level		
		High	Medium	Low
SO1: Fair income for farmers	Ensure higher and stable agricultural income and equity of support	✓		
	Preserve production potential	✓		
	Use risk management instruments more and more efficiently		✓	
SO2: Increase competitiveness	Increase added value of agricultural production (also under SO3)	✓		
	Increase productivity and competitiveness with innovative technologies	✓		
SO3: Improve farmers' position in the food chain	Improve horizontal and vertical connectivity of producers		✓	
SO4: Climate change action	Improve practices that contribute to climate adaptation and mitigation	✓		
	Increase energy use from renewable sources in agricultural production		✓	
SO5: Environmental care	Apply practices to reduce negative impacts on soil, water and air and increase organic matter	✓		
SO6: Preserve landscapes and biodiversity	Implement practices and investments to protect and increase biodiversity and conservation of genetic resources		✓	
	Improve practices to protect and increase biodiversity habitats and species in Natura 2000 areas		✓	
	Preserve mosaic agricultural landscape and landscape features			✓
SO7: Generational renewal	Improve the age structure of holdings	✓		
	Facilitate access to initial capital for investments	✓		
SO8: Vibrant rural areas	Create new jobs by diversification of production (also under SO7)	✓		
	Improve infrastructure in rural areas		✓	
	Encourage inclusion of stakeholders in local development		✓	
SO9: Food and health quality	Strengthen animal welfare practices		✓	
	Encourage healthy and sustainable food consumption			✓
XCO: Foster knowledge and innovation	Improve skills of the workforce in the agricultural food chain	✓		
	Improve entrepreneurial capabilities of manufacturers		✓	
	Facilitate access to transfer of knowledge and skills		✓	
	Improve access to research and development and use of knowledge and technologies in agriculture		✓	

Source: Authors based on Ministry of Agriculture (2022[36]).

2.3.3. Support for direct payments and sectoral interventions

The CAP 2023-27 includes five types of direct payments: the mandatory basic income support for sustainability (BISS); complementary redistributive income support for sustainability (CRISS); complementary income support for young farmers (CIS-YF); the eco-schemes for the climate, the environment and animal welfare; and coupled income support (CIS).[13] As in the previous CAP, Member States may also opt to grant a lump sum payment of up to EUR 1 250 to small farmers.

All Member States had to allocate funds to the BISS and eco-schemes. Redistributive support (CRISS) was elective and implemented by all Member States except Denmark and Malta. The payment for young farmers (CIS-YF) was implemented by all countries with the exceptions of Denmark and Portugal. The

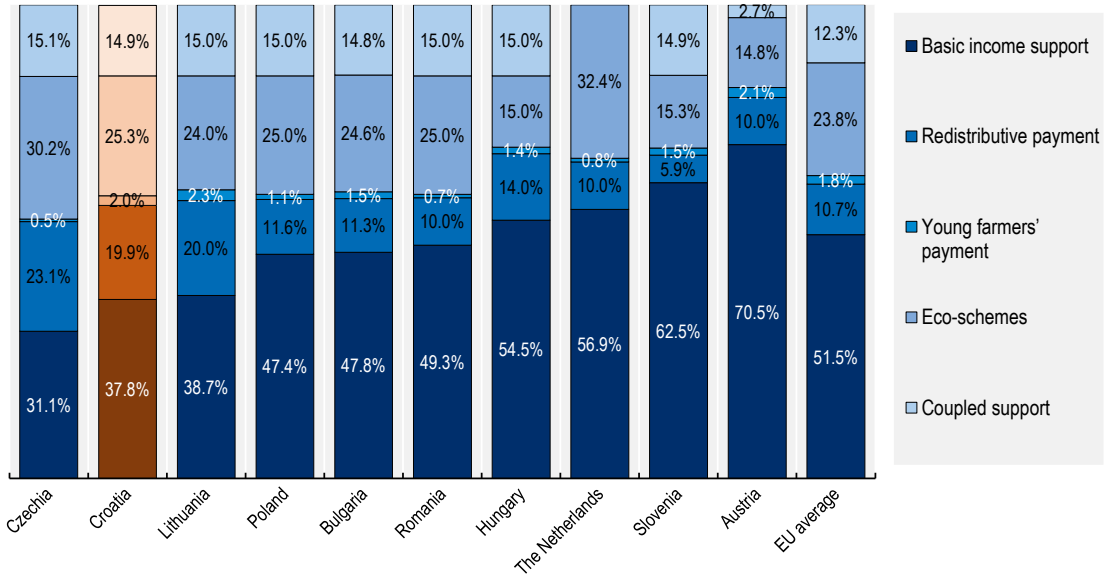
choice of implementation of coupled income support and the payment for small farmers was left to Member States. Croatia opted to grant coupled income support, but not the payment for small farmers.

Croatia's Pillar 1 choices intend to improve the distribution of support among beneficiaries and support young farmers

Basic income support (BISS) makes up 38% of Croatia's Pillar 1 budget. This share is below the EU average and that of most peer countries (Figure 2.5). On the other hand, Croatia selected to allocate more than the minimum 10% to redistributive support (CRISS). Thus, 20% of the envelope for direct payments will be paid for the first 30 eligible hectares, rather than the first 20 hectares as in the previous programming period. The objective of this allocation is to reduce the existing imbalance between large and small beneficiaries produced by the direct payment system and achieve a fairer distribution of support. As in 2014-22, Croatia chose not to apply the other instruments available for the redistribution of support (capping and degressivity), considered inappropriate for the structure of the Croatian economy and associated with disproportionate administrative costs (Ministry of Agriculture, 2022[36]).

Figure 2.5. Croatia's choices reflect a lower-than-average allocation to basic support and a higher allocation to the redistributive payment

Distribution of direct payment budget by type of measure, selected Member States and EU average



Note: The figure does not include sectoral measures.
Source: Authors, based on an analysis of Member State CSPs.

Two per cent of the envelope for direct payments in Pillar 1 will fund additional income support for young farmers of 40 years or less. Although the ratio of younger to older farmers has improved in the last ten years (see also Section 1.4.1), the share of young farm owners is still considered low. Additional resources for young farmers are granted under the rural development interventions (see below).

Croatia plans to use the maximum allocation for coupled income support

As in the previous CAP period, Croatia opted for the maximum possible allocation for coupled payments (13% plus 2% for protein crops), with a total budget of EUR 281 million for 2023-27. Coupled income

support (CIS) will be provided through nine interventions supporting seven sectors (Table 2.4). The largest share of coupled payments is directed to the livestock sector. These payments are complemented by coupled support from the State budget, which is provided as *de minimis* aid[14] to dairy farms and to other sectors (Section 2.4.2). Agricultural policies that provide support coupled to production can distort production signals and potentially result in negative environmental impacts (Henderson and Lankoski, 2019[37]).

Coupled payments are seen as contributing to the stabilisation of agricultural incomes in sensitive sectors that have been affected by a decrease in production and in the number of farms. The objective of maintaining production in these sectors for food security purposes was underscored by the COVID–19 pandemic and the war in Ukraine (Ministry of Agriculture, 2022[36]).

Table 2.4. Two-thirds of coupled payments will support the beef and dairy sectors

Coupled payment allocations in the CSP 2023-27

Sector	EUR million	Share
Milk and milk products (two interventions)	104.0	37.0%
Beef and veal (two interventions)	81.7	29.1%
Sheep and goats	17.0	6.0%
Subtotal livestock	*202.6*	*72.1%*
Fodder protein crops	37.5	13.3%
Sugar beet	23.5	8.3%
Fruit	6.9	2.4%
Seed	6.8	2.4%
Vegetables	3.9	1.4%
Subtotal crops	*78.4*	*27.9%*
Total	**281.1**	**100.0%**

Note: Milk and milk products, beef and veal and sheep and goats are the only livestock sectors eligible for coupled support as per Article 33 of Regulation (EU) 2021/2115. The pig and poultry sectors are thus excluded.
Source: Authors, based on the CSP of Croatia.

Eco-schemes are concentrated on crop rotation and diversification and manure use

Croatia allocated 25% of its direct payment envelope (EUR 468 billion) to eight eco-schemes[15] covering the areas of climate (mitigation and adaptation), water management, soil management, biodiversity, and animal welfare (Table 2.5). The only area of action foreseen in the CAP legislation that was not covered by the Croatian eco-schemes is the reduction in pesticide use (Münch et al., 2023[35]). Two eco-schemes (intensified diversity of agricultural land and intensified maintenance of ecologically significant areas) will be granted as top-up payments, while the rest will be paid in the form of compensation (Ministry of Agriculture, 2022[36]).

The largest budget share (42%) has been allocated to the eco-scheme “intensified diversity of agricultural land” for crop rotation and diversification. This practice was already promoted through the greening payment in the previous CAP, but was applicable to arable land only. It has now been extended to other types of land including greenhouses on arable land, meadows, pastures, karst pastures, vineyards, olive groves, orchards, short rotation crops, nurseries and mixed perennial plantations. The eco-scheme “use of manure on arable land” is the second most important, with 16% of the budget allocation. It requires the application of manure on arable land with the objective of increasing the content of organic matter in the soil by reducing the use of synthetic mineral fertilisers. The other eco-schemes promote the sowing of legumes, grazing, conservation agriculture practices such as reduced tillage, and the preservation of ecologically significant areas and grasslands.

Table 2.5. Over 40% of the funds for eco-schemes was allocated to crop diversification

Overview of Croatia's eco-schemes and budget distribution for 2023-27 (EUR million)

Eco-scheme	Main requirements	Budget	Share
1. Intensified diversity of agricultural land	• Cultivate a certain number of different types of crops/plantations and/or include different types of land use depending on farm size. • <10 ha: at least two different types of crops/plantations and/or different types of land use, the area of the main crop/main type of land use must not exceed 75% of the total area. • 10-30 ha: at least three different types of crops/plantations and/or different types of land use, the area of the main crop/main type of land use must not exceed 60% of the total area. • >30 ha: at least four different types of crops/plantations and/or different types of land use, the area of the main crop/main type of land use must not exceed 60% of the total area and the three main crops together/three main types of agricultural land use, may not occupy more than 90% of agricultural land. • Mandatory training related to the scheme.	198.2	42.3%
2. Grazing on pastures	• Maintaining pastures and karst pastures by mandatory grazing. • Keeping a plan and record of the activities. • Use of mineral fertilizers, manure, and plant protection products forbidden.	48.4	10.3%
3. Intensified maintenance of ecologically significant areas	• Ensure the maintenance of the ecologically significant areas (landscape features, zones around watercourses etc.) on a minimum of 10% of users' land. • Mandatory training related to the scheme.	5.2	1.1%
4. Use of manure on arable land	• Users must have an analysis of their soil and manure and a fertilization plan. • Manure use allowed in an amount that corresponds to the application of nitrogen from manure from 70 kg N/ha to 150 kg N/ha.	74.3	15.9%
5. A minimum share of legumes of 20% within agricultural areas	• Grow at least 20% of grain and/or of forage legumes within the total farm area. • Legumes can be grown as a main crop, intercrop, or sub-crop. • Mandatory training related to the scheme. • Use of mineral fertilizers is forbidden.	67.4	14.4%
6. Conservation agriculture	• Carrying out reduced tillage without overturning the soil. • Ensuring soil coverage with plant residues or green cover. • Mandatory training related to the scheme.	37.5	8.0%
7. Preservation of grasslands of great natural value	• Prohibition to apply plant protection products or use mineral fertilizer. • Prohibition of sowing the lawns and hydro melioration procedures. • Mowing must be done in specific period. • Mandatory training related to the scheme.	29.8	6.4%
8. Application of organic fertilisers in permanent plantations	• Users must have a soil analysis for the plots of land on which organic fertiliser is used and keep records on the use of organic fertiliser. • Users must create a fertilisation plan and submit it to the APPRRR. • Prohibition of using synthetic mineral fertilisers.	7.6	1.6%
Total budget		**468.5**	**100.0%**

Source: Authors, based on the CSP of Croatia.

Croatia used some flexibilities in the implementation of conditionality

The enhanced conditionality of the 2023-27 CAP requires beneficiaries of direct payments and some rural development payments to fulfil environmental and animal welfare regulations and good practices through eleven Statutory Management Requirements (SMR) and nine standards for Good Agricultural and Environmental Conditions (GAEC). Member States are allowed to use exemptions and select the practices required (Münch et al., 2023[35]). An overview of the 2023-27 GAECs with the main implementation choices of Croatia is provided in Section 3.1.3.

The new CAP introduces the concept of "social conditionality", which requires compliance with requirements related to the social and labour rights of agricultural workers. Member States may delay the

implementation of social conditionality, but they will have to have implemented it by 1 January 2025. Due to the complexity of setting up systems at the national level, the vast majority of Member States − including Croatia − deferred its application to 2025 (Münch et al., 2023[35]).

Two-thirds of the budget for sectoral market interventions will go to wine

In addition to direct payments, CAP Pillar 1 includes interventions that target specific agricultural sectors under the common market organisation (CMO). They may be granted in the form of reimbursement of eligible costs, unit costs, lump sums or flat-rate financing of market interventions. They apply to fruit and vegetables, wine, hops, olive oil and table olives, and apiculture products. They can be mandatory or optional depending on the agricultural profile of the Member State.[16] Interventions in apiculture are mandatory for all and must be co-financed by an equal amount of national funds. Wine interventions are mandatory for 16 countries (including Croatia). Measures for fruit and vegetables are mandatory for countries with recognised producer organisations in the sector (which also includes Croatia). Accordingly, Croatia has programmed interventions in these three sectors.

Sectoral interventions are relatively small, taking up less than 2% of Croatia's overall CSP funding. Their budget for 2023-27 is EUR 62.5 million. Almost two-thirds of this budget (EUR 41.6 million) will be in the wine sector, mainly covering investments in the production or marketing of wine and support for the restructuring and conversion of vineyards. Apiculture interventions amount to EUR 19 million, funded in equal parts by the European Union and the national budget. Fruit and vegetable interventions have a budget of EUR 1.7 million. Examples of sectoral interventions include co-financing investments in tangible and intangible assets and research, and promotion and marketing actions undertaken by producer organisations.

2.3.4. Support for rural development

Over 40% of the Pillar 2 budget will support investments

The rural development component of the 2023-27 CAP includes eight types of interventions. This represents an important simplification with respect to the preceding CAP period (which encompassed 20 measures). The current rural development interventions, often referred to by the corresponding article of Regulation (EU) 2021/2115 are: (1) Environment, climate-related and other management commitments (Article 70); (2) Natural or other area-specific constraints (Article 71); (3) Area-specific disadvantages resulting from certain mandatory requirements (Article 72); (4) Support for investments (Articles 73 and 74); (5) Setting-up of young farmers and new farmers and rural business start-up (Article 75); (6) Risk management tools (Article 76); (7) Cooperation[17] (Article 77); and (8) Knowledge exchange and dissemination of information (Article 78).

Member States are mostly free to allocate funds to the interventions as they judge appropriate, but must respect several ring-fencing requirements, such as reserving a minimum of 35% of their EAFRD envelope to environmental, climate and animal welfare actions undertaken across Articles 70 to 74 and reserving 5% of EAFRD funds for LEADER.

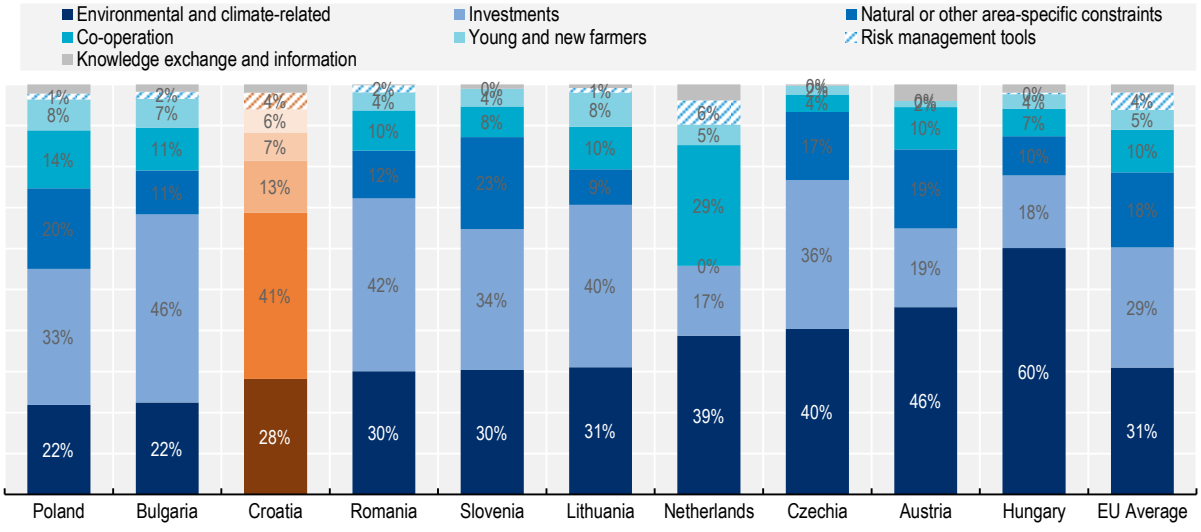
Article 94 allows up to 6% of the EAFRD envelope to be used to finance technical assistance actions for the effective administration and implementation of the CSP, including the establishment and operation of national CAP networks. Croatia has reserved EUR 50 million of EAFRD funds for these purposes. Use of this fund was to start in 2025, as technical assistance activities for 2023-24 were to be financed with funds from the 2014-22 RDP (Ministry of Agriculture, 2022[36]).[18]

As shown in Figure 2.6, Croatia has placed greater emphasis on investments compared to the EU average: the relative importance of this component is shared by other newer Member States. The budget share for environmental, climate-related, and other management commitments is slightly lower than the EU average,

as is the allocation to the co-operation component. However, the budget allocated to young farmers and new entrants, risk management tools, and knowledge exchange and innovation is in line with the EU average.

Figure 2.6. The allocation to investments is relatively high but similar to other newer EU Members

Distribution of rural development budget by type of measure, selected Member States and EU average



Note: The funds allocated to interventions in areas with natural and other constraints and for area-specific disadvantages resulting from certain mandatory requirement (Articles 71 and 72) have been grouped in the category "Natural or other area-specific constraints". The category "Support for investments" groups the funds allocated to investments in general (Article 73) and investments in irrigation (Article 74). The figure does not include the EAFRD contribution for technical assistance (Article 94).
Source: Authors, based on an analysis of Member State CSPs.

Funding for investments intends to support productivity improvements and the development of public irrigation infrastructure

EUR 713 million, or 41% of the Pillar 2 budget, have been allocated to investments. Most interventions will take the form of grants, with a relatively small amount of funds (approximately 2.3% of the investment funding) reserved for financial instruments. Over half of this funding is earmarked for investments to improve the overall efficiency and sustainability of primary agricultural production (intervention 73.10) and to promote the processing of agricultural products and the creation of value added (intervention 73.11) (Table 2.6). Eligible investments include those for restructuring and modernising farm holdings, improving the disposal, handling and use of manure, using renewable energy sources on farms, building or modernising processing capacities, and introducing digital technologies.

This component will also finance investments in public irrigation systems, with priority given to investments in undeveloped areas, areas with lower rainfall than the national average, and irrigation systems with a higher economic rate of return and in soil suitable for irrigation (see also Section 3.3.2).

The three financial instruments included are credits, loans, and guarantees for micro, small and medium enterprises, with funding of about EUR 6 million allocated to each intervention. They seek to support investments in tangible and intangible assets or finance working capital to improve the efficiency and sustainability of holdings and promote the creation of value added. They will also help farmers develop non-agricultural activities that can contribute to the economic diversification of rural areas.

Table 2.6. More than half of investment funding will support production and processing

Planned investment measures (Articles 73 and 74) and budget for 2023-27 (EUR million)

	Total budget	EAFRD	National co-financing	Share
Investments (Article 73)				
Non-productive investments in agriculture for nature and the environment	20.4	16.3	4.1	2.9%
Renewal of agricultural potential	22.5	18.0	4.5	3.2%
Use of renewable energy sources	30.0	24.0	6.0	4.2%
Construction and arrangement of educational paths and accompanying infrastructure	1.2	0.9	0.2	0.2%
Reconstruction (conversion) of degraded forests	11.8	9.4	2.4	1.6%
Modernisation of forestry technologies in wood harvesting, silviculture works and production of forest reproduction material	20.0	16.0	4.0	2.8%
Modernisation of technologies in pre-industrial wood processing	26.9	21.5	5.4	3.8%
Construction of forest infrastructure	11.8	9.4	2.4	1.6%
Promotion of forest products and services	1.2	0.9	0.2	0.2%
Support for investments in primary agricultural production	223.7	178.9	44.7	31.4%
FI_Support for investments in primary agricultural production	5.9	4.7	1.2	0.8%
Support for investments in the processing of agricultural products	155.8	124.6	31.2	21.8%
FI_Support for investments in the processing of agricultural products	5.3	4.2	1.1	0.7%
Support to small farmers	30.0	24.0	6.0	4.2%
Support for public infrastructure in rural areas	58.8	47.1	11.8	8.2%
Business development in rural areas	10.0	8.0	2.0	1.4%
FI_Business development in rural areas	5.9	4 .7	1.2	0.8%
Investments in irrigation (Article 74)				
Support for public irrigation systems	72.4	57.9	14.5	10.1%
Total Articles 73 and 74	**713.3**	**570.7**	**142.7**	**100%**

Note: The code FI_ refers to financial instruments.
Source: Authors, based on the CSP of Croatia.

Agri-environmental commitments mostly support organic farming and animal welfare

The environmental dimension in Pillar 2 is mainly incorporated through environmental and climate-related measures (Article 70). These interventions will be supported with EUR 496 million, or 28% of the rural development budget. The two most important interventions in this category, accounting for 79% of the planned funding, are support for the transition and maintenance of organic farming (EUR 238 million) and support for animal welfare practices (EUR 155 million).

Member States had the choice to support organic farming through the Pillar 1 eco-schemes or through a combination of eco-schemes and rural development interventions. Croatia will fund it exclusively from rural development funds (Münch et al., 2023[35]). The intervention will support the conversion and maintenance of organic areas for arable crops, vegetables, perennial crops, and permanent plantations. Among other obligations, beneficiaries are required to attend mandatory training. Policies regarding organic farming are further detailed in Section 3.2.3.

The animal welfare payment is granted to beneficiaries who implement measures for improved nutrition, housing conditions, access to outdoors and care of cattle, pigs, poultry, goats, and sheep, with specific requirements adjusted to each type of animal.

Table 2.7. Organic farming and animal welfare take up almost 80% of the rural development funding for environmental and climate commitments

Planned environmental, climate-related and other commitments (Article 70) and budget for 2023-27 (EUR million)

	Total budget	EAFRD	National co-financing	Share
Reduction in the use of protection means in perennial plantations	41.8	33.5	8.4	8.4%
Preservation of biodiversity and the environment on permanent grasslands and arable land	2.9	2.3	0.6	0.6%
Preservation of endangered autochthonous breeds of domestic animals	38.9	31.1	7.8	7.8%
Organic farming	237.8	190.2	47.6	47.9%
Support for conservation, sustainable use and development of genetic resources in agriculture	11.8	9.4	2.4	2.4%
Animal welfare	155.5	124.4	31.1	31.3%
Preservation of landscape features	5.2	4.2	1.0	1.0%
Preservation of extensive orchards and olive groves	2.7	2.2	0.5	0.5%
Total Article 70	**496.5**	**397.2**	**99.3**	**100.0%**

Source: Authors, based on the CSP of Croatia.

Other rural development interventions support areas affected by natural constraints, young farmers and the LEADER approach

While the largest share of the CSP Pillar 2 budget has been allocated to investments and to environmental commitments, measures that stand out among the remaining rural development interventions include payments that will benefit areas with natural constraints (EUR 213 million or 12% of Pillar 2 funds). This intervention targets areas where unfavourable climate or soil characteristics or remoteness make agricultural production difficult or costly. They include mountainous regions and isolated areas such as the islands and the Pelješac peninsula.

Co-operation interventions (Article 77) represent almost 7% of the planned Pillar 2 financial allocation. Most of this funding will go to LEADER, the community-led local development approach, with a target of 54 local development strategies implemented by Local Action Groups and supported by EUR 103 million of public funds (European Commission, 2023[38]).

A budget of EUR 101 million (6% of the Pillar 2 funding) has been reserved for investments supporting business development by young farmers and start-up companies in rural areas (Article 75). The largest share of funds under this component will be provided as a one-off lump sum payment to young farmers for the implementation of a business plan related to agricultural production or processing. Another intervention will help registered farmers (of any age) diversify into non-agricultural activities, which can include services in rural areas, traditional crafts or tourism.

Risk management (Article 76) was allocated EUR 70 million (4% of the funding for Pillar 2). The intervention in this component is agricultural insurance support (Section 2.5). Support for knowledge transfer and agricultural advisory services was granted EUR 35 million (2% of the Pillar 2 allocation). This component will be further detailed in Chapter 4.

Table 2.8. Other rural development interventions support farmers in remote areas, young and new entrants and agricultural insurance

Other rural development interventions and budget for 2023-27 (EUR million)

	Total budget	EAFRD	National co-financing	Share of each component
Natural or other area-specific constraints (Article 71)	**213.7**	**170.9**	**42.7**	**100.0%**
Payments for areas with natural and other constraints	213.7	170.9	42.7	
Area-specific disadvantages resulting from certain mandatory requirements (Article 72)	**8.8**	**7.1**	**1.8**	**100.0%**
Subsidies for limitation in forest management	8.8	7.1	1.8	
Setting up of young farmers and new farmers and rural business start-up (Article 75)	**101.5**	**81.2**	**20.3**	**100.0%**
Establishment of young farmers	76.5	61.2	15.3	75.4%
Diversification to non-agricultural activities	25.0	20.0	5.0	24.6%
Risk management tools (Article 76)	70.2	56.2	14.0	100.0%
Agricultural production insurance	70.2	56.2	14.0	
Cooperation (Article 77)	**120.7**	**96.6**	**24.1**	**100.0%**
Support for participation of farmers in quality systems	3.8	3.0	0.8	3.1%
Support for information and promotion activities carried out by groups of producers in the internal market	1.2	0.9	0.2	1.0%
Support for EIP operational groups	5.1	4.1	1.0	4.2%
Support for short supply chains and local markets	2.5	2.0	0.5	2.1%
Support for establishment and operation of producer organizations	5.3	4.2	1.1	4.4%
Support LEADER approach	102.9	82.3	20.6	85.2%
Knowledge exchange and dissemination of information (Article 78)	**35.3**	**28.2**	**7.1**	**100.0%**
Support for knowledge transfer	17.6	14.1	3.5	50.0%
Support for the provision of advisory services	17.6	14.1	3.5	50.0%

Source: Authors, based on the CSP of Croatia.

2.4. Other domestic policies

In addition to programmes and measures under the direct payments and rural development pillars of the CAP, Croatia applies a number of other policies that seek to support the agro-food sector and promote the development of rural areas. They include measures financed from other EU funds as well as state aid and national programmes fully financed from the State budget.

2.4.1. The Croatian Recovery and Resilience Plan

In the Next Generation EU plan to mitigate the impact of the COVID-19 pandemic, the European Union authorised around EUR 720 billion in loans and grants to support Member States' Recovery and Resilience Plans, which outline reforms and investments that seek to make their economies and societies more sustainable, resilient, and prepared for the green and digital transitions; they also address country-specific recommendations from the European Commission (European Commission, n.d.[39]).

In this context, the Croatian Recovery and Resilience Plan (RRP), of July 2021, was initially allocated EUR 6.3 billion in grants. It was amended in December 2023 to add additional grant and loan funding for energy transition under the REPowerEU Plan,[19] to reach EUR 10 billion or 18.5% of Croatia's GDP (European Parliament, 2024[40]). The plan outlines reforms and investments designed to address the social and economic impacts of the COVID-19 pandemic and of two devastating earthquakes that occurred in 2020. It contains 78 reforms and 157 investments structured into five broad components (economy; public

administration, judiciary and state assets; education, science and research; labour market and social protection; and health) and one initiative (renovation of buildings). Component 1 (Economy) has the highest share of the RRP's overall funding, with EUR 3.7 billion.

Investments and reforms focusing on the agro-food sector are in subcomponent 1.5 (Improving the use of natural resources and strengthening the food supply chain), with EU funding of EUR 131.7 million. It includes eight investments grouped into four measures: (1) establishment of a network of logistics infrastructure to strengthen the production market chain in the fruit and vegetable sector, (2) improvement of the system for agricultural land restructuring and consolidation, (3) digital transformation of agriculture and (4) improvement of the food donation system. Table 2.9 outlines the specific interventions and funding. For some of the investments, such as those related to the logistics infrastructure network, some co-financing by end-users is foreseen.

Table 2.9. The largest RRP investments will strengthen the logistic capacity for fruit and vegetables

Detail of RRP measures and funding distribution (million EUR) for the agro-food sector

Measure/ Investment	Name	Implementation timeframe	EU funds
C1.5. R1	**Establishment of a logistics infrastructure network**	1/2021 - 6/2026	**82.1**
R1-I1	Construction of logistics distribution centres (LDC)	1/2021 - 6/2026	81.3
R1-I2	Strengthening the position and recognition of producers	3/2023 - 6/2026	0.8
C1.5. R2	**System for restructuring and consolidation of agricultural land**	4/2021 - 3/2026	**35.1**
R2-I1	Consolidation	4/2021 - 3/2026	33.3
R2-I2	Monitoring	6/2021 - 6/2025	1.7
C1.5. R3	**Digital transformation**	2/2020 - 12/2025	**10.3**
R3-I1	Establishment of digital public services	2/2020 - 9/2025	1.9
R3-I2	Smart agriculture platform	2/2020 - 12/2025	6.7
R3-I3	Traceability system	6/2021 - 12/2024	1.7
C1.5. R4	**Food donation system**	3/2021 - 12/2023	**4.3**
R4	Upgrade of the food donation platform	3/2021 - 12/2023	0.3
R4-I1	Equipment of the food bank and donation intermediaries	6/2021 - 12/2023	4.0
TOTAL	**4 measures, 8 investments**	2/2020 – 6/2026	**131.7**

Note: The amounts were originally expressed in HRK and were converted to EUR using a rate of 1 HRK = 0.1327 EUR.
Source: Government of the Republic of Croatia (2021[41]).

As of December 2023, almost EUR 3 billion of the grants intended for Croatia had been disbursed (European Commission, 2024[42]). Regarding the implementation of the investments under Component 1.5, the first two projects for the construction of logistics distribution centres for fruits and vegetables (investment R1-I1) were approved in early 2023 with EUR 25 million of support allocated (Ministry of Agriculture, 2023[43]), and the first Regional Distribution Centre for Fruits and Vegetables was opened in the county of Osijek-Baranja. In addition, the first point for monitoring agricultural soil (investment R2-I2) was established in July 2023, with the Soil Centre of HAPIH responsible for its implementation (Croatian Agency for Agriculture and Food, 2023[44]). Finally, the existing IT platform for food donations (measure R4) was upgraded in 2022 with additional functionalities, in particular adapting the existing system to regional management (Ministry of Agriculture, 2022[45]).

2.4.2. Other support measures not financed by CAP funds

Additional coupled payments from the State budget are granted to sensitive products

In addition to payments financed by the CAP, Croatia provides coupled support from the State budget to certain products that have been designated in the national legislation governing support to agriculture as "extremely sensitive". These schemes were implemented as transitional state aid for three years after EU accession and afterwards as *de minimis* state aid which, according to EU rules, may not exceed EUR 25 000 per beneficiary in a three-year period. Eligible beneficiaries must produce, deliver and sell extra virgin olive oil, produce and deliver Burley of Virginia tobacco for processing, keep dairy cows or breeding sows, or produce plants from a specific list of autochthonous and protected varieties, and provide evidence of this to the APPRRR. The payments apply per head for dairy cows and breeding sows, per hectare for plants, per kilogram for tobacco, and per litre for olive oil (Ministry of Agriculture, 2023[46]).

In 2022, the amount paid for this type of support was EUR 13.5 million. It has shown a decreasing trend since 2017 (when it amounted to EUR 16.5 million) (Ministry of Agriculture, 2023[47]). The maximum financial envelope assigned to this programme in 2024 was EUR 14 million, with the largest budgets for dairy cows (EUR 6 million) and tobacco (EUR 5 million).

A special coupled support programme seeks to retain the production of sugar beet

Considering the circumstances that have led to a stark reduction in the production of sugar beet and sugar (Box 1.4), sugar beet production receives coupled support from the State budget in addition to that granted under the CAP. The programme (also implemented as *de minimis* support) aims to maintain producers' interest in this crop, which has declined since EU accession. It grants a payment per hectare to farmers who ensure the sowing of sugar beet on their farms by crop rotation and deliver sugar beet to the processing chain. The payment is applied degressively, with the highest amount (EUR 530 per hectare) granted to farms with less than 40 hectares of sugar beet and the lowest (EUR 130 per hectare) to those with 200 hectares or more (Ministry of Agriculture, 2023[48]).

Retaining sugar beet production is considered essential to guarantee the survival of the existing processing capacities, and important for crop rotation and the fertility of agricultural land. In 2022, 191 producers received HRK 6 million in support (approximately EUR 796 000).[20] This is a decrease from 2021 when the programme granted HRK 7.3 million (around EUR 970 000) to 384 beneficiaries (Ministry of Agriculture, 2023[47]; Ministry of Agriculture, 2022[49]). The extension of this programme was approved in October 2023 with a total budget of EUR 6.5 million for 2023-27.

National funds supplement CAP support for the conservation of native breeds

Several programmes financed with national funds support breeding programmes and the preservation of livestock breeds, in particular Croatia's autochthonous and endangered breeds (see also Box 3.2). The main intervention in this area is part of the CSP (measure 70.03), with a total budget of EUR 39 million. Additional programmes financed by national funds provide support mainly as payments per head. They include: (i) programme for encouraging the implementation of breeding programmes for warm-blooded horse breeds (APPRRR, 2021[50]), with an annual budget of HRK 1.2 million (around EUR 165 000) for 2021-25; (ii) programme for the improvement of sheep and goat breeding, with an annual budget of HRK 2.5 million (around EUR 333 333) for 2021-23; (iii) programme for the improvement of original poultry breeds, to co-finance the breeding of Croatian hens and Zagorski turkeys, with a budget of HRK 1.5 million (EUR 200 000) per year in 2021-23 (APPRRR, 2021[51]) and (iv) programme for co-financing the work of breeding associations in the field of animal husbandry, with a budget of approximately HRK 2 million (EUR 266 667) per year in 2021-23 (Ministry of Agriculture, 2021[52]).

Over 200 small state aid programmes are managed by agencies at different levels

Other small state aid programmes are managed by different national, regional and local authorities and agencies. In 2022, a total of EUR 62.5 million was allocated to the agricultural sector through 194 small value grant programmes and 11 state aid programmes provided by the Ministry of Agriculture, local and regional self-governments, the Ministry of Veterans Affairs, the Ministry of Economy and Sustainable Development, the Croatian Agency for SMEs, Innovation and Investments (HAMAG BICRO), and the Croatian Bank for Reconstruction and Development (HBOR) (Ministry of Agriculture, 2023[47]).

2.4.3. Financial instruments

Small farmers can access several financial instruments from public providers, but the supply of commercial credit is limited

Sources of finance from public agencies for agriculture in Croatia include the Croatian Agency for SMEs, Innovation and Investments (HAMAG BICRO) − which implements the CAP financial instruments for rural development and other financial instruments for small and medium enterprises −, the Croatian Bank for Reconstruction and Development (HBOR) – which offers larger investment loans, including those under the RDP − and commercial finance providers. Only eight out of 26 commercial banks active in Croatia offer specific finance for the agricultural sector, which consists almost exclusively of loans. This limited supply of commercial finance is believed to be the result of banks not having lending policies that properly consider the specificities of agricultural production (fi-compass, 2020[53]).

The picture is somewhat different in the case of companies in food and beverage production, which have access to a more diversified and versatile supply of financial products. SMEs in the sector can access the financial instruments implemented by HAMAG-BICRO and the HBOR, as well as products offered by commercial banks to companies in general, including those specifically targeting SMEs. They include short and medium-term loans, permanent working capital loans, long-term investment loans, guarantees, and leasing products (fi-compass, 2020[53]). See also Section 1.2.5 on the sector's financial gaps and needs.

2.4.4. Tax incentives

Farmers are exempt from excise duties on a fixed amount of diesel for agricultural use

Farmers are exempt from excise duties on blue-dyed diesel for agriculture. This exemption, which also applies to fisheries and aquaculture, was introduced in 2010 to lower production costs for the sector. The excise duty on diesel would otherwise amount to EUR 353 per 1 000 litres. Other uses also benefit from partial exemptions, such as a duty rate of EUR 21 per 1 000 litres applied to diesel for heating (Ministry of Finance of Croatia - Customs Administration, n.d.[54]).

The programme for agriculture is managed by the Paying Agency in Agriculture, Fisheries and Rural Development (APPRRR). Only agricultural holdings in the Farm Register can use blue diesel. Beneficiaries are entitled to a quota determined by APPRRR according to the hectares of agricultural land (from 50 litres per hectare (l/ha) for meadows and pastures to 600 l/ha in the case of arable land) or the number of livestock heads in the farm (from 1 l/ha for fattened pigs to 180 l/ha for dairy cows). Users are issued a fuel card (GPR card[21]) on request of APPRRR, which they must use every time they purchase blue diesel. The card is used to monitor fuel consumption against the authorised quota.

The Customs Administration (Ministry of Finance) publishes yearly reports with data on the quota used and the subsidy amount provided for each month of the year.[22] The 2022 quota of blue diesel for farmers was 206 million litres. Of these, 154.5 million litres were used, with an estimated subsidy amount of HRK 423 million (approximately EUR 56 million).

In some cases, small farmers are exempt from personal income tax

Farmers benefit from other tax measures, many of them aimed at easing the administrative burden they face. For example, low-income farmers (with an annual income below EUR 10 685) are either exempt from paying personal income tax altogether or may calculate the tax on the basis of a flat rate. They are also not obligated to register for value-added tax (VAT) (OECD, 2020[55]).

Self-employed farmers are liable for income tax only if their total annual income from agricultural and forestry activities exceeds EUR 10 685 or if they are liable for VAT. They can also deduct from their tax base the state support for education and training or the incentives for research and development received. Farmers (along with all other taxpayers) from regions with difficult economic conditions and the city of Vukovar[23] can also benefit from tax reliefs in the form of exemption from personal income taxes.

Foodstuffs and agricultural inputs are subject to a lower VAT rate

Certain agro-food products and agricultural inputs benefit from lower value-added tax (VAT) rates. The standard VAT rate in Croatia is 25%. A reduced rate of 5% applies to numerous foodstuffs, such as all types of bread, all types of milk (but not other dairy products), baby foods, edible oils and fats, meat and meat products, fruits and vegetables, eggs, live farm animals, seedlings and seeds, fertilisers and pesticides, and animal feed (other than pet food). The provision of food in hospitality facilities is subject to a VAT rate of 13%.[24]

2.4.5. Policies related to agricultural land management

State-owned agricultural land is allocated by local governments. Changes in the legal framework and lengthy procedures can create difficulties for farmers

Approximately one-third of agricultural land in Croatia is publicly owned. This high percentage is a consequence of the transition from the socialist system, as land that was socially owned in Yugoslavia changed to state ownership (see also Section 1.2.4).

State-owned agricultural land can be leased, offered for temporary use, exchanged for other land, or sold, as provided for in the Agricultural Land Act. Allocation is managed by local self-government units (municipalities and towns), which must submit a programme for the disposal of the state-owned agricultural land in their territory for approval by the Ministry of Agriculture (Ministry of Agriculture, 2023[47]).

The land can be sold through a public tender, provided that it does not belong to certain categories such as ponds, common pastures, or particularly valuable arable land (Ministry of Agriculture, 2023[56]). A maximum of 50 hectares in the continental part of Croatia (or 5 hectares in the coastal areas) may be sold to an individual buyer. In sale tenders, priority is given first to those already using the land and then to the owners of neighbouring plots. Buyers must cultivate the land for ten years and may not sell or transfer it during this time. If they decide to sell the land after this period, the State has right of priority to purchase it at market price (Croatian Parliament, 2022[57]). The initial value of state-owned land for a public tender is determined on the basis of the property market information system *eNekretnine*.

Lease contracts are concluded for 25 years for permanent plantations or 15 years for other production types and can be extended for the same number of years. The lease is done through public tender, with the initial rent price based on the plot size and a unit rent per hectare established according to the location and type of land.[25] Local self-government units launch the tenders and allocate the land, with the allocation subsequently approved by the Ministry of Agriculture (Ministry of Agriculture, 2022[36]). A scoring system is applied to determine the most favourable bidder in lease tenders, with priority given to the bidder with the highest score (Table 2.10). Of the funds generated from the disposal of state-owned agricultural land, 65%

go to the budget of the local self-government unit, 10% to the budget of the regional self-government unit, and the remaining 25% to the State budget (Ministry of Agriculture, 2023[47]).

Table 2.10. Young and female farmers get extra points in bids for state-owned agricultural land

Scoring system for the allocation of lease tenders

Category	Points
Current holders of the land	15-20
Type of agricultural production (up to a maximum of 30 points for dairy cattle and milk production)	15-30
Place of residence of the bidder (higher score for local residents)	5-20
Young farmers (up to 41 years) and female farmers	3-8
Education and experience in agriculture	3-4
Organic farming in at least 25% of area, or breeders of autochthonous breeds	5
War veterans, children of veterans who died or went missing	5
Members of producer organisations, employers of at least one full-time employment	2-3
Direct payments represent a maximum of 30% of total income from agriculture	5
Maximum total points	100

Source: Croatian Parliament (2022[57]).

Between 2018 and 2022, the Ministry of Agriculture approved 368 programmes[26] for the disposal of state-owned agricultural land, for a total of 310 582 hectares (ha). Most disposal programmes were for lease of the land (87% of the area). However, the actual conclusion of lease agreements with users was slower: in 2018-22, local authorities announced 226 public tenders for the lease of 54 912 ha. In the same period, the Ministry of Agriculture approved 139 decisions on the selection of the most favourable bidder, covering 15 063 ha. The lease agreements actually concluded covered only 11 524 ha of land or 3.7% of the land in the approved disposal programmes (Ministry of Agriculture, 2023[47]). State-owned land that has not been leased or sold must be maintained suitable for agricultural production, with maintenance works performed by the corresponding local government.

The Agricultural Land Act has been reformed several times. This is a source of uncertainty: private sector participants in the OECD fact-finding mission pointed to the challenges created by frequent changes in the legal framework related to agricultural land. The World Bank noted that the administrative procedures for the allocation of state-owned agricultural can be inefficient and lengthy, creating constraints in the agricultural land market and hindering the structural transformation (World Bank, 2019[24]). Other factors that slow down the disposal of state-owned land include obsolete data in the land cadastre and lack of control by the state inspection (Vranken et al., 2021[58]). The reforms introduced in the most recent legal amendment (approved in May 2022) intend to speed up the process of disposal.

One of the investments of the Croatian Recovery and Resilience Plan (RRP) grants EUR 33 million of public funds (with an additional EUR 6 million of national co-financing) to support land consolidation projects by regional self-government units on a target area of at least 18 000 hectares. These projects seek to consolidate small and distant parcels of agricultural land, resolve legal issues around property, harmonise and update the data from various records, build roads for easier access to agricultural land, and build reclamation systems where needed. Land consolidation would be carried out in several stages, the first being the identification and collection of data (such as ownership status, the existence of real rights, land layout, land valuation) on the land where consolidation could potentially take place, and updating the data in the cadastre and land registry (Government of the Republic of Croatia, 2021[41]). In April 2022 Croatia adopted a reform to the Law on the consolidation of agricultural land, which sets the terms and rules for these consolidation processes, with the first public calls for the selection of land consolidation areas published in 2023 and 2024.

Some restrictions remain on the acquisition of agricultural land by foreigners

The Agricultural Land Act regulates the acquisition of land by foreigners. It states that, unless otherwise provided by an international agreement or special regulation, foreign natural and legal persons are not allowed to acquire or hold any property rights in agricultural land. Exceptionally, non-residents can acquire the right of ownership on agricultural land by inheritance, under reciprocity conditions.[27] A reform to the Law on Agricultural Land was under discussion by the Croatian Parliament as of October 2025. The amendment abolishes the condition of reciprocity in cases where agricultural land is inherited by natural and legal persons from countries that are adherents to the OECD Codes of Liberalisation of Capital Movements and of Current Invisible Operations (Croatian Parliament, 2025[59]).

2.4.6. Policies related to migration and inclusion

Recent policies seek to encourage the Croatian diaspora to return to rural areas

Emigration following accession, particularly towards other EU countries, has been the main driver of Croatia's rapid population decline. Emigration flows traditionally surpassed immigration, although this trend reversed in 2022 for the first time in 15 years (Section 1.4.3). Over the past decade, Croatia has adopted policies to engage with its diaspora population and encourage returns, recognising their potential contribution to the local economy and the revival of rural areas. This includes facilitating the obtention of Croatian citizenship for the descendants of emigrants and implementing various programmes and subsidies, particularly targeted towards the young and highly educated (OECD, 2025[60]). One example is the programme "I Choose Croatia". This scheme, launched in 2021, provides grants of up to EUR 7 000 to Croatian citizens abroad who move back and start their own business. Additional funds are granted to those settling in depopulated rural areas. The programme is applicable to diaspora members living in the European Economic Area, the United Kingdom, Argentina, Australia, Brazil, Chile, Canada, New Zealand, and the United States (Central State Office for Croats Abroad, 2023[61]).

Requirements for foreign labour have been relaxed to respond to an increased demand

The need to respond to an evolving labour market has driven recent reforms to immigration policies. In 2017 there was a substantial increase in immigration quotas. However, as the quota system was deemed too rigid to respond to changes in the labour market, it was replaced in 2021 with a labour market testing regime (OECD, 2025[60]).

Under the current system, the employment of third-country nationals[28] either for seasonal work for up to six months or as agricultural workers under contract for one year (with the possibility of extension) requires a labour market test by the Croatian Employment Service (CES). This requirement is waived for a list of high-demand occupations that includes bakers, butchers and, in certain regions, waiters and cooks.[29] If the test determines there are no available workers in the Croatian labour market, employers may apply for a stay and work permit on behalf of a specific third country national. If all conditions are met, the CES provides a positive opinion to the Ministry of the Interior. Following additional security tests by the Ministry of the Interior, a stay and work permit can be issued.

Seasonal workers from third countries can obtain a stay and work permit for up to 90 days. For these short-term workers in agriculture, forestry, hospitality and tourism, permits may be issued without the labour market test (Ministry of the Interior, 2023[62]).

The permits issued are not always fully used. For example, in 2020 only 43% of the permits for agriculture and forestry were used. While this low use may relate to the COVID-19 situation, utilisation of the 2019 quota was also not full (72%) (European Migration Network - Ministry of the Interior, 2021[63]). The OECD has found that Croatia's labour migration model places a high administrative burden on public authorities, who have insufficient capacity to deal with the rapid increase in the demand for stay and work permits,

leading to the slow processing of applications (OECD, 2025[60]). In the context of the OECD fact-finding visit to Croatia, representatives from the agro-food sector indicated that the lack of labour to work in farms and in food processing is a matter of concern, and expressed that the quotas for third-country nationals should be higher.

EU and State funds support policies for the inclusion of women and minorities

As detailed in Section 1.4.2, Croatia's gender gap in paid work is smaller than the OECD average. Even if data for agriculture is limited, the evidence points to certain disadvantages for women in rural areas, which are also linked to the general urban-rural disparities. In March 2023, the government adopted the National Plan for Gender Equality for the period until 2027. One of its goals is to improve the position of rural women. Actions by the Ministry of Agriculture to implement this measure include conducting workshops that aim to increase the number of female farm owners.

The Make a Wish programme (*Zaželi*) is a policy initiative that has contributed to improving the employment status of rural women, while also addressing the gap in care services. The programme was introduced in 2017 and is mainly funded by the European Social Fund. Make a Wish grants funds to local and regional authorities and non-governmental organisations, particularly from rural areas and the islands, to train and employ women to provide at-home care services for the elderly and infirm. It targets women over 50 years of age and those belonging to vulnerable groups, such as women with disabilities, homeless women, victims of domestic violence, and those who have been treated for addiction (OECD, 2018[64]). While the programme was initially aimed at promoting the employment of older women, it has also made an important contribution to the delivery of care services for seniors. The programme had a very positive reception and there was a high demand for participation. It was recently extended up to 2027 (OECD, 2025[60]).

The rights of national minorities are protected by the Constitutional Law on National Minorities and they are entitled to be represented by eight elected Members of Parliament. Croatia funds the implementation of programmes and projects to support the minority population, with the annual State funding for national minority purposes increasing from EUR 25 million in 2019 to EUR 39 million in 2022 (Council of Europe, 2023[65]). Initiatives to address the specific challenges of the Roma community are carried out under the National Strategy for Roma Inclusion for 2021-27. The Office for Human Rights and the Rights of National Minorities (OHRRNM) carried out a project to map the size of the Roma population in Croatia and analyse their socio-economic outcomes, with the aim of further improving policies for Roma inclusion (OECD, 2025[60]).

Some programmes specifically support farmers in areas traditionally inhabited by minorities. In November 2023, the Ministry of Agriculture announced the results of a tender for financing projects of local infrastructure and rural development in areas inhabited by members of national minorities. EUR 4.9 million of national funds will finance grants of up to EUR 10 000 to self-sufficient family farms and family agricultural holdings (known in Croatia as OPGs; see Box 1.1) in areas with more than 5% of members of national minority groups, to help them transition to market-oriented production, with the objective of fostering the socio-economic empowerment of national minorities (Ministry of Agriculture, 2023[66]).

2.5. Risk management and resilience policies

Croatia has advanced toward an integrated approach to disaster risk management

In 2016 Croatia established the Disaster Risk Reduction Platform, managed by the Ministry of the Interior, to promote a co-ordinated decision making, as activities in this area fall within the competences of individual ministries. The Disaster Risk Management Strategy until 2030 was adopted in October 2022. The Strategy aims to reduce disaster risks by predicting, mitigating, and preventing them, and to provide the information and tools necessary for decision-making. It also seeks to increase preparedness for

disaster management. The Ministry of Agriculture is the competent institution for making assessments of threats related to plant diseases, animal diseases, and drought (Government of the Republic of Croatia, 2022[67]).

In the SWOT analysis done for the preparation of the CAP Strategic Plan, Croatian authorities identified agricultural risk management as a policy area where further progress is needed. Under CAP Strategic Objective 1 (support viable farm income and the resilience of the agricultural sector), using risk management instruments more and more efficiently was identified as a need with a medium level of priority, after the high-priority objectives of improving farmers' incomes and preserving production potential (Table 2.3). The analysis points out to the potential of investing in farmers' knowledge of risk management tools and mitigation measures and increasing their uptake (Ministry of Agriculture, 2022[36]).

Agricultural risk management policies in Croatia focus mainly on supporting the insurance of agricultural production through the co-financing of insurance policies from rural development funds. However, compensatory payments in the case of natural disasters and other crisis situations are frequent. Some investments and crisis prevention activities are also included within the sectoral interventions for the fruit and vegetable sector.

But still, several programmes grant ad hoc aid in response to crisis situations

State aid from national funds has been granted to respond to different crisis situations. Several programmes were launched in 2020 and 2021 to help primary producers that faced difficult business conditions due to the COVID-19 pandemic. The total national funds granted to these programmes between 2020 and 2022 was approximately EUR 55 million, and as of 2023 they were no longer active.

A support programme for the disposal of animal by-products in 2021-23 was launched to respond to market disruptions that, starting in 2017 and aggravated by the COVID-19 pandemic, caused increases in the cost of disposal of by-products from slaughtering livestock. It consists of a subsidy of up to HRK 0.2 per kilogramme of by-product. The programme budget is HRK 5 million (around EUR 666 667) for each year of implementation (Ministry of Agriculture, 2021[68]).

The Small Value Support Program for Farmers for the Procurement of Mineral Fertilizer was adopted in March 2022. It has a budget allocation of HRK 200 million (approximately EUR 27 million). This programme compensates farmers for the higher production costs caused by the increase in the price of mineral fertiliser with a subsidy per hectare up to a maximum of 20 hectares (Ministry of Agriculture, 2022[69]). A total of HRK 95.4 million (about EUR 12.7 million) were granted to respond to 26 928 requests for support received in 2022 (Ministry of Agriculture, 2023[47]).

Another programme launched in August 2022 supports micro-, small- and medium-sized producers of seed corn (maize) facing difficulties linked to the war in Ukraine. It consists of a payment of up to HRK 5 000 (EUR 667) per hectare up to a maximum of HRK 263 700 (approximately EUR 35 000) per beneficiary (Ministry of Agriculture, 2022[70]). The programme budget was HRK 7.5 million (approximately EUR 1 million), of which 42% had been allocated at the end of 2022 (Ministry of Agriculture, 2023[47]).

Two larger state aid programmes for damage compensation were approved in December 2022. The first one, with an allocation of HRK 200 million (approximately EUR 27 million), compensates producers of processed agricultural goods for the increases in energy prices. The second, with HRK 100 million (around EUR 13 million) provides direct financial support to producers of corn, soybeans, sunflowers, sugar beets, tobacco, fruits and vegetables that suffered damages from drought during 2022 (Ministry of Agriculture, 2023[47]). A further *ex post* compensation programme with a budget of EUR 10 million was approved in July 2023 to mitigate the consequences of natural disasters that occurred in 2023 by compensating farmers for up to 50% of the damages suffered.

In June 2023, Croatia reported the detection of cases of African Swine Fever (World Organisation for Animal Health, 2023[71]). Given the disruptions caused by the outbreak in the pork sector, the government

approved several measures to compensate producers for the losses incurred and to maintain pig production in the affected areas. The total budget is EUR 41.2 million, of which EUR 7.5 million were spent in 2023. This budget may be increased depending on how the epidemiological situation evolves.

Policies and funding focus on agricultural insurance, yet uptake remains low

Before 2013, farmers had access to insurance subsidies financed from the State and local government budgets, which covered respectively 25% and 10% of the premiums (Radović, 2020[72]). Following EU accession, the subsidy was increased to 70% in the 2014-22 Rural Development Programme. A total of EUR 97.7 million was provided to around 46 000 requests under measure 17.1.1. "Insurance of crops, animals and plants" of the RDP (Ministry of Agriculture, 2023[73]).

In the 2023-27 CSP, EUR 70 million of public funds (80% financed by the EAFRD) have been allocated to intervention 76.01 "Insurance of agricultural production". These funds support farmers in the acquisition of agricultural insurance by subsidising up to 70% of the insurance premium, with a maximum annual subsidy amount of EUR 75 000 per beneficiary.

Beneficiaries must have contracted an insurance policy with a private company that covers damages caused by the loss of more than 20% of the average annual agricultural production due to unfavourable climatic conditions (frost, lightning strikes, storms, hail, ice, longer periods of high temperatures and heavy rain and their consequences in the form of floods, droughts or fire) or animal diseases as recognised by the World Organization for Animal Health. Farmers must have paid at least 30% of the insurance premium before submitting the application for support to the Paying Agency for Agriculture, Fisheries and Rural Development. The Paying Agency processes the application and, after determining that all conditions have been met, pays the subsidy amount either directly to the insurance company or to the user (Ministry of Agriculture, 2023[74]). To avoid overlaps, producer organisations that are beneficiaries of harvest insurance under the CAP sectoral market intervention provisions[30] are not eligible for this intervention.

Before 2018, farmers had to pay the full price of the premium before submitting the subsidy application. The change to the current system, in which farmers pay only 30% of the premium price upfront, is believed to have had a positive impact in the number of applications. According to the Ministry of Agriculture, between 2016 and 2019 the number of requests for support increased almost four times, from 2 359 to 9 006 (Ministry of Agriculture, 2019[75]). Despite the increase in uptake, farmers' usage of insurance remains low, with only 8% of registered farmers insured as of 2019 (covering around 50% of total production) (World Bank, 2019[24]). Noting this low insurance coverage, the SWOT analysis highlights the need to step up insurance promotion activities and start a discussion with insurance companies on how to make insurance products more accessible to small farmers.

Other risk management interventions, including support for mutual funds and prevention, have a limited scope and less funding

The CSP includes additional risk management measures in the context of the sectoral interventions in the fruit and vegetable sector, which have a total public budget of EUR 1.8 million. These interventions benefit producer groups and organisations. Specific measures within this component include co-financing the costs of establishing, filling and replenishing mutual funds through which the producer group can prevent and manage losses and damages arising from crisis situations, as well as co-financing climate adaptation activities.

Some rural development interventions in the CSP also support the prevention of risks. For example, support for non-productive investments (intervention 73.01, with total public funding of EUR 20 million) can co-finance the removal of invasive species, the construction of electric fences or the purchase of dogs from autochthonous breeds (such as the Croatian shepherd) to protect herds from predators in areas where large carnivores are present. In addition, intervention 73.02 (total public funding EUR 22.5 million) co-finances eligible costs for the restoration of production potential damaged or lost due to natural disasters and catastrophic events.

2.6. Trade policies affecting the agricultural sector

Trade liberalisation was an important part of the economic reform programme that Croatia undertook to repair the damages of the war and advance in its transformation from a centrally planned to a market economy. In this context, Croatia applied for accession to the General Agreement on Tariffs and Trade (GATT) in September 1993.[31] After concluding this process, it became a member of the World Trade Organization (WTO) in November 2000. Following its WTO accession, Croatia continued reforming its trade and related policies and legislation to align them with the WTO agreements and, after its 2003 application for EU membership, with the EU *acquis* (World Trade Organization, 2010[13]). Upon its EU accession, under the EU trade policy, Croatia became a party to the EU's trade agreements with third countries and withdrew from the trade agreements it had previously signed, such as the Central European Free Trade Agreement (CEFTA) with neighbouring countries.[32]

The European Union is a single market with free movement of goods, services, capital, and people. Trade between Member States − including all agriculture and food trade − is not subject to any tariffs or non-tariff measures (NTM). The European Commission guarantees the well-functioning of the single market and determines the external trade policies of the bloc. As a member of the European Union, Croatia has full access to the EU single market and is an integral part of it.

2.6.1. The EU trade policy framework

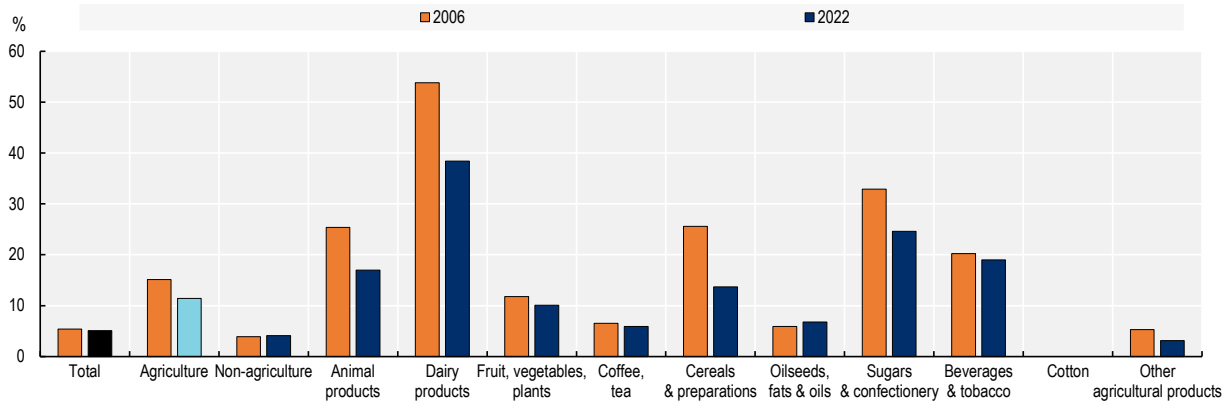
The policies governing trade with non-EU countries are an exclusive competence of the EU. The common commercial policy covers trade in goods and services, intellectual property, foreign direct investment (FDI) and public procurement. Trade agreements with non-EU partners are negotiated by the European Commission on behalf of Member States. Within this framework, measures related to trade in agro-food products, such as tariffs and tariff rate quotas (TRQs) are defined and co-ordinated at the EU level, as is the large majority of legislation related to Sanitary and Phytosanitary (SPS) measures and technical barriers to trade (TBT).

Agro-food products face higher tariffs than other sectors and are subject to numerous non-tariff measures

Imports of goods into the European Union are subject to the Common Customs Tariff (CCT) regime.[33] Agro-food trade overall is subject to higher applied tariffs than other sectors: in 2022, the simple average most-favoured nation (MFN) tariff applied by the European Union on agro-food products (as defined in Annex I of the WTO Agreement on Agriculture) was 11.4%, compared with 4.1% for non-agricultural goods (Figure 2.7). Certain subsectors face tariff peaks, with maximum rates of up to 144% (against a maximum of 26% for other products). In addition, 31% of agro-food tariff lines were subject to non-*ad valorem* (NAV) tariffs[34] (as opposed to only 0.6% for non-agricultural goods) (World Trade Organization, 2023[76]), which can increase complexity in trade. For example, tariffs on certain food products are calculated based on their content of milk or sugar, and some vegetables are subject to seasonal tariffs that can take a mixed form (an *ad valorem* plus a specific tariff by weight) in certain months (D'Elía, 2016[77]).

Figure 2.7. Agro-food tariffs in the EU are almost three times higher than for other sectors

EU most-favoured nation applied tariffs by product groups, 2006 and 2022



Note: The figure shows simple average rates. The calculation of the average includes an estimation of *ad valorem* equivalents for tariffs expressed in NAV form. Agriculture is defined according to Annex I of the WTO Agreement on Agriculture.
Source: WTO (2023), World Tariff Profiles 2023, https://www.wto.org/english/res_e/publications_e/world_tariff_profiles23_e.htm and WTO (2006), World Tariff Profiles 2006, https://www.wto.org/english/tratop_e/tariffs_e/tariff_profiles_2006_e/tariff_profiles_2006_e.pdf.

The EU average agro-food tariff has decreased over time. At 11.4% in 2022, it is below its 2006 value of 15.1%.[35] The 2022 average tariff is higher than in OECD members such as Australia, Chile, New Zealand, the United Kingdom and the United States, and accession candidates Brazil and Peru, but lower or similar to Costa Rica, Colombia, Japan, Norway, and Switzerland. Of these countries, only Switzerland, Norway, the United States, and the United Kingdom have similar or higher shares of tariff lines subject to NAV tariffs (Table 2.11).

Table 2.11. The EU has a relatively high share of agro-food tariffs in non-*ad valorem* form

Agricultural MFN tariffs in selected countries, 2022

	Average MFN tariff on agriculture	Agriculture tariff lines with non-*ad valorem* MFN duties (%)
OECD Members		
Australia	1.2	0.9
Chile	6.0	1.0
Colombia	14.3	15.1
Costa Rica	11.5	0.0
European Union	11.4	31.3
Japan	13.4	13.1
New Zealand	2.3	0.1
Norway	35.5	42.9
Switzerland	32.4	69.2
United Kingdom	9.4	26.2
United States	5.1	42.5
Accession candidates		
Brazil	8.0	0.0
Peru	2.8	3.2

Note: The table shows simple averages. The calculation of the average includes an estimation of *ad valorem* equivalents for tariffs expressed in NAV form. Agriculture is defined according to Annex I of the WTO Agreement on Agriculture.
Source: WTO (2023), World Tariff Profiles 2023, https://www.wto.org/english/res_e/publications_e/world_tariff_profiles23_e.htm.

Tariffs on agro-food imports can also be increased through the special agricultural safeguard (SSG), under which an additional import duty is applied if a trigger import price or volume is reached. In its WTO commitments, the European Union reserved the right to use the SSG for 539 tariff lines and has invoked it at least once each year since 1995, most recently using the price-based safeguard for one line of poultry products in the marketing year 2022/23 (World Trade Organization, 2023[78]).

A large number of agro-food products is subject to tariff rate quotas (TRQs), which allow for the import of determined quantities subject to a lower or zero tariff rate. The European Union uses three types of quotas: (i) WTO TRQs, established pursuant to its WTO schedule of commitments, (ii) preferential TRQs, granted to products from trade agreement partners, and (iii) autonomous TRQs, which can be opened to facilitate access of certain agricultural and industrial products insufficiently available in the European Union.

WTO TRQs are available for 124 products. They cover a wide range of sectors, including meat, dairy, cereals, fruits, vegetables, sugar, and other processed products. In 2022, 29 of the quotas were fully used (fill rate of 100%), and 31 had not been used at all (fill rate of 0%); the average fill rate (imports as a percentage of quota quantity) was 39% (World Trade Organization, 2023[79]). In the case of autonomous TRQs, as of June 2023 they were open for four agro-food products: mushrooms of the species *Auricularia polytricha*, preserved sweet cherries for use in chocolate products, animal feed additives, and unprocessed tobacco (Official Journal of the European Union, 2023[80]). The products and quantities for preferential TRQs are defined in the specific EU trade agreements. As a transitional measure provided for in the Treaty of Accession, the EU authorised Croatia to maintain an autonomous TRQ for the import of 40 000 tonnes of raw cane sugar for refining for a period of three years following accession.

TRQs can be allocated either on a first-come-first-served (FCFS) basis or on the basis of import licences. In 2022, 35% of the European Union's agricultural TRQs were allocated by licences and 65% under the FCFS method (World Trade Organization, 2023[81]). TRQs allocated on a FCFS basis are managed by the Directorate General for Taxation and Customs Union (DG TAXUD) and available for agricultural and non-agricultural products. TRQs administered through import licences exclusively concern agricultural products and are managed by the Directorate General for Agriculture and Rural Development (DG AGRI). The licences are issued by competent authorities in Member States to any applicant registered on their territory for Value Added Tax (VAT) purposes, require lodging a security to guarantee that the commitment to import will be fulfilled, and are valid in all of the EU (World Trade Organization, 2023[82]).

Beyond tariffs and quantitative restrictions, the European Union applies other non-tariff measures (NTMs), such as sanitary and phytosanitary measures and technical barriers to trade, on agro-food imports. They include requirements on food production and safety, animal and plant health, animal welfare, alien organisms, and gene technology (OECD, 2023[21]). A 2016 inventory estimated that only 0.5% of food products, 1% of vegetable products and 4% of animal products in the European Union were not subject to NTMs (WITS, 2018[83]).

The European Commission's Directorate General for Health and Food Safety (DG SANTE) is responsible for the formulation of policies related to sanitary and phytosanitary (SPS) measures. DG SANTE is also in charge of monitoring Member States' implementation and enforcement of these measures and of notifying them to the World Trade Organization (WTO). Multilateral rules require WTO Members to have enquiry points responsible for answering questions and providing relevant documents on SPS measures. In the case of the European Union, the enquiry point is DG SANTE alongside with Member States' enquiry points. In 2022, the European Union notified 105 SPS measures to the WTO, or almost 5% of the total notifications submitted by WTO Members. As of November 2023, and based on the cumulative number of notifications submitted since 1995, the European Union is the fourth notifying WTO Member after the United States, Brazil, and Canada (World Trade Organization, n.d.[84]).

While SPS measures are mostly associated with agricultural products, the universe of technical barriers to trade (TBT) measures of relevance for the sector is smaller. They can include standards for food packaging and labelling, animal welfare measures, or measures on chemicals for agricultural and veterinary use

(Gourdon, Stone and van Tongeren, 2020[85]). Of the 83 TBT notifications that the European Union submitted in 2022, 14 covered agro-food products, addressing aspects such as the labelling of organic pet food, production rules for organic salts for food and feed, or standards for olive oil, among others. A further four TBT notifications concerned agricultural pesticides and fertilisers. Based on the number of TBT notifications presented up to November 2023, the European Union is also the fourth notifying WTO Member after the United States, Uganda, and Brazil (World Trade Organization, n.d.[84]). The European Union enquiry point for TBT measures is the Directorate General for Internal Market, Industry, Entrepreneurship and SMEs (DG GROW), along with Member States' enquiry points.

The European Union has a network of 42 regional trade agreements with 74 partners. These agreements are seen as a key factor contributing to the European Union's position as a major global trader of agro-food products and to the resilience of the sector. The United Kingdom is the European Union's most important preferential partner, as well as the top destination of its agro-food exports and the main source of agro-food imports (European Commission, 2023[86]). The European Union also grants duty-free and quota-free access to all imports (except arms and ammunition) from least developed countries (LDCs) and unilateral trade preferences to other developing countries (subject to eligibility criteria) under its Generalised Scheme of Preferences (GSP).

2.6.2. Policies at the national level

Several national agencies implement agro-food trade policies

In Croatia, the overall responsibility for the border process is in the hands of the Customs Administration, which co-ordinates with other government authorities present at the border, including the Ministry of Agriculture and the Ministry of Health (responsible for official controls regarding food and feed safety, food quality, animal health, animal welfare and plant health) and the State Inspectorate (in charge of sanitary, phytosanitary and veterinary inspections).

The competent national authority for receiving applications and issuing import and export licences for agro-food products is the Paying Agency in Agriculture, Fisheries and Rural Development (APPRRR, see Section 2.1.3). The APPRRR also plays a role in the control and enforcement of tariff quota regulations, ensuring that importers respect the quantitative limits and conditions specified in their licences. The Customs Administration publishes information on the quotas in force in the European Union and other measures for individual products. Applications for import or export licences can be submitted in paper form or electronically through the AGRONET system (APPRRR, 2020[87]).

In the area of SPS, the Ministry of Agriculture is responsible for establishing rules and measures concerning plant varieties, plant health and the use of pesticides and fertilisers, as well as for the detection, monitoring, prevention, control, and eradication of animal diseases and zoonoses. The national enquiry point for sanitary issues and animal health is the Service for Border Veterinary Inspection (part of the State Inspectorate) and the International Trade Division at the Veterinary and Food Safety Directorate of the Ministry of Agriculture. For phytosanitary issues and plant protection, the national enquiry points are the Sector for Agricultural Supervision and Phytosanitary Supervision and the Sector for Sanitary Inspection (part of the State Inspectorate) and the Directorate General for Agricultural Land, Plant Production and Market of the Ministry of Agriculture.

In the area of food safety, the Ministry of Agriculture is the contact point for communication and reporting to the European Commission. It is in charge of defining food safety policy in terms of basic principles, basic hygiene rules, rules for official controls, microbiologic criteria, labelling and consumer information, traceability of food and animal feed, fraud prevention, certifying of laboratories, registration and approval of operators of food of animal origin and animal feed, pesticide residues, and rules related to animal feed. The State Inspectorate is responsible for food safety inspections and official controls and is the national

contact point for the Rapid Alert System for Food and Feed (RASFF), which is initiated in the event of an identified risk.

The Croatian Agency for Agriculture and Food (HAPIH) also plays a role in the implementation of SPS and food safety policies, providing professional and scientific support to the Ministry of Agriculture and participating in the implementation of official controls.

The Ministry of Health is responsible for establishing the rules related to food contact materials, contaminants in food, food additives, auxiliary substances in the production process, food supplements, nutritional and health claims, novel foods and genetically modified food and feed, among other aspects. It is also in charge of taking temporary emergency measures when a serious risk is identified.

The national enquiry point for the WTO TBT Agreement is the Croatian Standards Institute (*Hrvatski zavod za norme* - HZN), which is in charge of providing information to other WTO Members on the technical regulations and standards effective in Croatia.

Croatia has a very good trade facilitation performance, but could improve co-operation among agencies

Policy related to the trade of agro-food products involves a complex array of policy objectives that are equally important, and their enforcement often involves multiple agencies (Moïsé and Sorescu, 2021[88]). While the trade policies applied in Croatia are defined at the European Union level, their implementation is charge of national agencies, including those outlined above. The OECD Trade Facilitation Indicators[36] benchmark country performance along the full spectrum of border procedures.

In 2022, Croatia had an overall average trade facilitation performance of 1.79 (of a maximum of 2), which put it in the top-25 of the 163 countries covered. The overall score improved from 1.553 in 2017, and Croatia's performance has consistently improved in most areas covered by the indicators. Performance scores were at or close to best practice in areas such as consultations with the trade community, automation of border processes, and streamlining of border procedures (which covers measures relevant for the treatment of perishable goods at the border in terms of inspection, storage, and release prior to the final determination and payment of duties, taxes, fees and charges). However, performance is lower in the case of internal agency co-operation (among agencies at the national level), where the score of 1.46 was below the OECD average of 1.62. Similarly, the score for external border agency co-operation (with neighbouring and third countries) at 1.55 is slightly lower than the OECD average of 1.6 (OECD, n.d.[89]).

Different public and private actors perform export promotion activities

Increasing the productivity and competitiveness of the agro-food sector is one of the strategic goals of Croatia's agriculture, and increasing the efficiency and added value and the market diversification for Croatian agricultural and food products are among the authorities' key priorities.

The Ministry of Foreign and European Affairs has the general responsibility for trade policy in Croatia. When carrying out this work, it consults with the Ministry of Economy and Sustainable Development (MESD) and with the Ministry of Agriculture for matters related to agro-food products. One of its tasks is providing support and advisory services to companies interested in exporting. This includes an export portal offering relevant information on accessing foreign markets and the publication on the Ministry's web page of opportunities in the European Union and third countries for the procurement of goods, including from the agro-food sector.[37]

The Internationalisation Directorate at the MESD also has a mandate for export promotion, along with other mandates such as the promotion of foreign investment. This Directorate was established in 2020 in the context of a wider government reform that included the absorption of the responsibilities of the previously existing Agency for Investments and Competitiveness (OECD, 2023[90]). As part of its work, it provides

advisory and operational support to companies in the process of internationalization and entering foreign markets.

Private sector groups such as the Croatian Chamber of Economy (HGK), the Croatian Exporters Association and the Croatian Chamber of Agriculture also provide support and information to their members and promote the participation of Croatian companies in conferences, meetings with foreign business entities, and sector fairs.

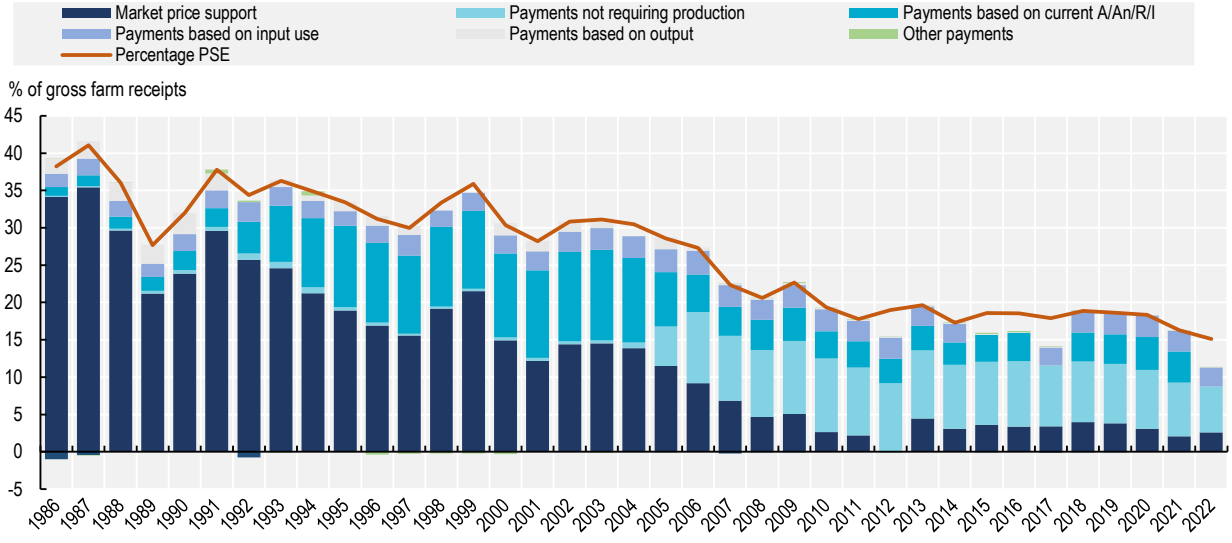
2.7. Evaluation of support to agriculture (PSE indicators)

2.7.1. Producer Support Estimate of the European Union

Reforms to the Common Agricultural Policy (CAP) over the last decades have reduced the European Union's support to agriculture and shifted its composition to less production- and trade-distorting measures (Figure 2.8). In 2020-22, EU support to producers[38] as a share of gross farm receipts stood at 16%, close to the OECD average.

Figure 2.8. CAP reforms have changed the share and composition of EU producer support

Level and composition by categories of the Producer Support Estimate for the European Union, 1986-2022



Notes: A/An/R/I:Area planted/Animal numbers/Receipts/Income. "Payments not requiring production" include Payments based on non-current A/An/R/I (production not required) and Payment based on non-commodity criteria. "Other payments" include Payments based on non-current A/An/R/I (production required) and Miscellaneous payments. European Union refers to EEC12 for 1986-94, EU15 for 1995-2003, EU25 for 2004-06, EU27 for 2007-13, EU28 for 2014-19, EU27 and the United Kingdom for 2020, and EU27 from 2021.
Source: OECD (2023), "Producer and Consumer Support Estimates", OECD Agriculture statistics (database), http://dx.doi.org/10.1787/agr-pcse-data-en.

Most of the European Union's support to agriculture goes to producers: in 2020-22, the Producer Support Estimate (PSE) represented 87% of its total support estimate (TSE). The majority of this support to producers (84% in 2020-22) is budgetary, granted mostly in the form of decoupled direct payments. Market Price Support (MPS) accounted for 16% of support to producers in 2020-22, down from 46% in 2000-02. On average, nearly half of budgetary support in 2020-22 was based on historical entitlements, while around 29% was based on current area or animal numbers requiring production, and 20% on input use.

In 2020-22, general services expenditures (General Service Support Estimate, GSSE) represented 12.9% of total support to agriculture, equivalent to 2.8% of the European Union's value of agricultural production. This is a decrease compared to 3.7% of the value of production in 2000-02 and is below the OECD average. That said, the European Union's GSSE expenditure actually increased in monetary terms between 2000-02 and 2020-22, but the value of agricultural production more than doubled in the same period. Expenditures on agricultural knowledge and innovation systems − the most important of the EU GSSE's components − increased over the past two decades, and their share of GSSE rose from 42% in 2000-02 to 52% in 2020 -22. The share of expenditures on marketing and promotion also increased, while the share of support for infrastructure and public stockholding decreased.

In its 2023 review of EU policies, the OECD made recommendations related to the structure and design of the CAP. Specifically on CAP payments, it recommended aligning budget allocations with stated priorities and addressing disincentives, linking payments that focus on sustainability, resilience and innovation objectives to monitorable performance, transitioning to targeted income support and introducing a clearer separation of income support from measures targeted towards environmental sustainability, and ensuring that CAP payments do not create barriers to entry (OECD, 2023[21]).

2.7.2. Budgetary support to agriculture in Croatia

As detailed in previous sections, budgetary support to agriculture in Croatia comes through both European Union policies (from the EU budget, in some cases with national co-financing) and national programmes. The annual average budgetary expenditures for agriculture in 2018-22[39] amounted to EUR 789 million (Table 2.12). Most (91.5%) of these expenditures supported producers. Out of all budgetary expenditures, EUR 583 million (74%) came from the European Union budget, and EUR 206 million (26%) from Croatia's budget.

EU-financed budgetary expenditures include CAP direct payments (EUR 316 million, most as decoupled income support) and market measures (EUR 12 million) under Pillar 1, as well as rural development support under Pillar 2 (EUR 295 million). Most of this support is provided to producers individually, but some rural development and market measures provide general services to the sector, such as knowledge transfer or infrastructure services. EU funds also co-financed some expenditures on veterinary and phytosanitary inspection services that were not part of the CAP.

Out of the EUR 206 million of expenditures financed from the Croatian budget, EUR 65 million corresponded to national top-ups provided during the phasing-in of Pillar 1 direct payments. This complementary support ceased in 2021. As of 2022, all direct payments were fully financed from the EU budget. A further EUR 57 million was provided by Croatia to co-finance CAP Pillar 2 and market measures. Fully national programmes amounted to an average of EUR 84 million. These include payments to support sensitive agricultural activities, state aid provided in response to crises, and revenue foregone from the tax exemption on agricultural diesel, as described in previous sections.

Table 2.12. EU funds finance almost three quarters of budgetary support to agriculture

Annual average budgetary support to agriculture in Croatia, 2018-22 (million EUR)

	Total	From EU budget	From national budget
1. Budgetary expenditures for producers	**722.21**	**533.59**	**188.62**
Measures fully or partly financed by the European Union			
CAP pillar 1 direct payments, of which:	315.95	315.95	0.00
Decoupled income support[1]	*268.70*	*268.70*	*0.00*
Coupled income support	*47.24*	*47.24*	*0.00*
CAP pillar 1 market measures	6.53	3.25	3.28
CAP pillar 2 rural development measures	250.39	214.39	36.00

	Total	From EU budget	From national budget
Measures fully financed from Croatia's national budget			
National top-ups to CAP direct payments (until 2021)[2]	65.31	0.00	65.31
National programmes, of which:	84.03	0.00	84.03
Tax exemption on agricultural diesel	*60.45*	*0.00*	*60.45*
Coupled payments from national budget	*16.18*	*0.00*	*16.18*
Other national programmes[3]	*7.40*	*0.00*	*7.40*
2. Budgetary expenditures for general services	**65.03**	**47.41**	**17.62**
Measures fully or partly financed by the European Union			
CAP pillar 1 market measures	5.83	5.58	0.25
CAP pillar 2 rural development measures	44.99	37.80	7.19
Other EU co-financed expenditures[4]	14.07	4.03	10.04
Measures fully financed from Croatia's national budget			
National programmes[5]	0.14	0.00	0.14
3. Budgetary expenditures for consumers	**2.12**	**1.93**	**0.20**
Measures fully or partly financed by the European Union			
School schemes (milk, fruit and vegetables)	2.12	1.93	0.20
Measures fully financed from Croatia's national budget			
National programmes	0.00	0.00	0.00
TOTAL BUDGETARY EXPENDITURES (1+2+3)	**789.36**	**582.92**	**206.44**
Measures fully or partly financed by the European Union	639.88	582.92	56.96
Measures fully financed from Croatia's national budget	149.48	0.00	149.48

1. Includes the basic payment, the redistributive payment, the young farmers' payment and the "greening" payment.
2. During the phasing-in of direct payments (2013-21), Croatia could top up EU-financed payments with national funds, as detailed in Section 2.2. From 2022 onwards, direct payments are fully funded by the European Union.
3. Includes programmes for the conservation of native breeds, to respond to the COVID-19 crisis and to Russia's invasion of Ukraine, and compensation to producers for losses due to natural disasters or pests and diseases, among others.
4. Includes expenditures on agricultural inspection services that were co-financed by the European Union.
5. Includes expenditures on agricultural research and inspection services that were financed exclusively from the national budget.
Source: Authors, with data from the Ministry of Agriculture and the Ministry of Finance of Croatia.

2.8. Conclusions

After independence, Croatia faced the enormous challenge of at once managing the transition from a centrally planned agriculture and dealing with the devastating effects of war. The country chose a path of integration into the multilateral trading system and strengthened ties with the European Union that entailed significant – and rapid – changes to its laws, policies, and policy paradigms.

The agricultural policy path has been determined by converging with the EU Common Agricultural Policy and at present policies are largely decided at the EU level. Nevertheless, the most recent CAP reform gives Croatia more leeway to adapt the CAP to national needs and priorities.

In 2023 Croatia started its second CAP cycle. Having fully phased in direct payments in 2022, it now has access to the entirety of the funds, and benefits from the experience of the 2014-22 CAP and the EU pre-accession funds. This experience, together with the input of experts and stakeholders and a comprehensive analysis to prioritise national needs, has informed the choices of the CAP Strategic Plan.

Some choices are similar to those of the 2014-22 CAP. Funds will again be transferred from the rural development budget to direct payments, but at a lower share. Croatia will continue supporting young farmers through direct payments and rural development funds, thus harnessing policies to attract young people to the sector. The plan also intends to use the redistributive payment to better target small and middle-sized farms. Coupled support will continue to be deployed up to the maximum share allowed.

Rural development support continues to give priority to investments for improving the sector's productive and processing capacity and value addition, and to measures to improve the situation of rural areas. In the environmental domain, the largest funding allocations go to organic farming and animal welfare. The funding allocated to other measures such as those on innovation continues to be low, and in the previous CAP period some of the measures had a low uptake.

Croatia funds other programmes − including coupled support to sensitive sectors – fully from its national budget. The EU-funded Recovery and Resilience Plan is another source of investments for improving logistics, land consolidation, monitoring soils, improving digitalisation, and reducing food waste.

The legal framework for the disposal of state-owned agricultural land has suffered many changes. The processes advance at a very slow pace, creating a bottleneck in the conclusion of land disposal contracts, uncertainty for farmers, and a potential obstacle to increasing land ownership by young farmers, potentially affecting their access to finance. A 2022 legal reform aims to speed up land disposal processes, particularly for young farmers, but its impact on the rate of contract conclusion is still to be seen.

Beyond agriculture, social policies are deployed to combat the abandonment of rural areas and contribute to their revitalisation. Policies seek to encourage the return of the diaspora to rural areas, employ women, improve access to at-home care services, strengthen services in areas inhabited by minorities, and relax the requirements for employing foreign labour so as to remedy labour market gaps.

Insurance is the most important agricultural risk management instrument. Despite improvements and administrative simplifications, it has a relatively low uptake. *Ad hoc* assistance to sectors in crisis is often applied. Other risk management and resilience measures have limited scope and less funding.

Croatia's agriculture is fully integrated into the EU single market, with free trade among the 27 EU Member countries. Trade policy with non-EU countries is defined at the EU level, with agro-food generally facing higher protection than other sectors, with market price support accounting for 16% of total producer support in the European Union in 2020-22 (OECD, 2023[20]). Croatia has made progress in implementation at the domestic level through trade facilitation improvements and could further strengthen inter-agency co-operation.

Promoting market diversification for agro-food products is an important national objective. At present, different public and private institutions perform export promotion activities but with no specific export promotion strategy for the agro-food sector. More targeted trade promotion could improve co-ordination and make the most of the efforts made by the different actors.

Going forward, Croatia could consider ways to make better use of the room for manoeuvre in the CAP and is invited to take account of relevant recommendations in the OECD review of EU policies in the sector (Box 2.3, OECD (2023[1]).

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Notes

[1] Guaranteed prices were eventually abolished and by 2010 no longer in place (World Trade Organization, 2010[13]).

[2] LEADER (*Liaison Entre Actions de Développement de l'Économie Rurale*) is an approach in the framework of EU rural development policy. It seeks to engage local actors from rural areas in the design and delivery of strategies, decision-making and resource allocation through Local Action Groups (LAGs) that bring together public, private and civil society stakeholders in a particular area. It is implemented under the Rural Development Programme of each EU Member State and co-financed by the European Agricultural Fund for Rural Development (EAFRD). See https://ec.europa.eu/enrd/leader-clld/leader-toolkit/leaderclld-explained_en.html.

[3] See https://rural-vision.europa.eu/rural-vision_en#a-vision-for-rural-areas-towards-2040

[4] See https://poljoprivreda.gov.hr/.

[5] See https://www.apprrr.hr/.

[6] See https://agronet.apprrr.hr/.

[7] See https://www.hapih.hr/.

[8] See https://dirh.gov.hr/.

[9] Calculated based on the CAP expenditure by Member State reported in the European Union's agriculture statistical fact sheet of June 2021 (https://agriculture.ec.europa.eu/system/files/2022-01/agri-statistical-factsheet-eu_en_0.pdf) and the gross value added for agriculture, forestry and fishing from the Eurostat indicator *Gross value added and income by A*10 industry breakdowns* (NAMA_10_A10).

[10] Hungary, Malta, Poland and Slovakia.

[11] Along with Denmark, Latvia, Romania, Greece, Lithuania, and Portugal.

[12] Hungary, Luxembourg, Malta, Poland and Portugal.

[13] This includes the crop-specific payment for cotton, which is mandatory in selected Member states (Bulgaria, Greece, Spain and Portugal).

[14] Small amounts of support that are exempted from notification to the European Commission under EU rules on state aid, since they are deemed to have no impact on competition and trade in the Single Market. Under the most recent regulation applicable to agriculture (Commission Regulation (EU) 2019/316), the total amount of *de minimis* aid that a single beneficiary may receive in any period of three fiscal years is EUR 20 000, which may be increased to EUR 25 000 provided that the country has in place a central register of *de minimis* aid and that it does not spend more than 50% of its total *de minimis* aid envelope on one particular agricultural sector.

[15] The CSP originally included seven eco-schemes. The eight eco-scheme, related to the use of organic fertilisers in permanent plantations, was added as a first amendment to the CSP at the end of 2023.

[16] Articles 42 and 43 and Annex VII of Regulation (EU) 2021/2115.

[17] This intervention covers a wide range of measures such as the European Innovation Partnership for Agricultural Productivity and Sustainability (EIP Agri), LEADER, smart villages strategies, producer groups, producer organisations, inter-branch groups, and participation in quality schemes.

[18] This was the status at the time this report was finalised (October 2024).

[19] The REPowerEU Plan, of May 2022, seeks to reduce the European Union's dependence on Russian fossil fuels though actions to save energy, diversify supplies and accelerate the roll-out of renewable energy (European Commission, 2022[92]).

[20] As the adoption of the euro is recent, many figures for Croatia are still expressed in Croatian kuna (HRK). When applicable, support figures in HRK have been converted using an exchange rate of EUR 1 = HRK 7.5.

[21] *Gorivo u poljoprivredi i ribarstvu* (Fuel in agriculture and fisheries).

[22] See https://carina.gov.hr/dokumenti/10?trazi=1&tip2=&datumod=&datumdo=&pojam=PLAVOG%20DIZELA&page=1 (accessed January 2024).

[23] Vukovar was heavily damaged during the war of independence. For this reason, special regulations have been established for its reconstruction and development.

[24] Article 38 of the Law on Value Added Tax.

[25] Regulation on the method of calculating the initial rent of agricultural land owned by the Republic of Croatia and fees for the use of water for the purpose of performing aquaculture activities (NN 89/2018 of October 2018).

[26] Of a total of 466 programmes submitted by local self-government units. Municipalities and towns that do not have state-owned agricultural land in their territory must only notify this to the Ministry.

[27] Reciprocity refers to allowing investments from residents of another country under terms similar to those applied by the other country. It is considered a form of discrimination among adherents to the OECD Codes of Liberalisation of Capital Movements and of Current Invisible Operations.

[28] Foreigners who are not nationals of the European Union, Iceland, Liechtenstein, Norway or Switzerland.

[29] The list for 2023 is available at: https://www.hzz.hr/app/uploads/2023/03/Lista-zanimanja-izuzetak-od-provedbe-testa-trzista-rada_2023.pdf (accessed in January 2024).

[30] Article 42 of Regulation (EU) 2021/2115 and Article 18 of Commission Delegated Regulation (EU) No. 2022/126.

[31] Yugoslavia had been a member of the GATT since 1966.

[32] Current members of CEFTA are Albania, Bosnia and Herzegovina, Moldova, Montenegro, North Macedonia, Serbia, and Kosovo. Like Bulgaria and Romania previously, Croatia terminated its membership in CEFTA as a consequence of its accession to the European Union.

[33] A more detailed discussion of agricultural market access, including a comparison of tariffs prior to and after EU accession, is taken up in the Market Openness Review prepared by the OECD Secretariat as background for the Trade Committee accession review process.

[34] Non-*ad valorem* (NAV) tariffs are those in which the duty rate is expressed in a form different that a percentage of the product's value. They can include specific, compound, mixed or technical tariffs. Their use can make the analysis of tariff rates more challenging, as they cannot be directly compared or aggregated and must first be converted into ad-valorem equivalents (AVEs), for which methodologies differ (González Marentis and Deuss, 2023[91]).

[35] The calculation of this average tariff rate requires obtaining ad valorem equivalents (AVE) for tariffs expressed in non-*ad valorem* form. There can be variations of the average rate depending on the methodology used.

[36] See https://www.oecd.org/trade/topics/trade-facilitation/

[37] Export portal: https://izvoz.gov.hr/. Export opportunities: https://mvep.gov.hr/o-hrvatskom-izvozu/izvozne-prilike/244678?sektor=40

[38] The current Producer Support Estimate (PSE) database calculates support at the European Union level. Estimates at the Member State level can vary.

[39] As agreed by the Committee for Agriculture in May 2024, this table presents data on budgetary expenditures underlying policies which support agricultural production, provided to producers individually, producers collectively (expenditures for general services) or to consumers. The planned expenditures for 2023-27 under the CAP Strategic Plan (including the budgeted national co-financing) were summarised in Table 2.2, and details on the specific measures presented in Sections 2.3.3 and 2.3.4.

3 Natural resources management

Croatia benefits from an overall good state of natural resources, with ecosystems among the richest in Europe and abundant water resources compared to the rest of the European Union. Agriculture has reduced its use chemical inputs and organic farming keeps expanding. Nonetheless, pressures from agricultural production still pose challenges. This chapter assesses the impact of agriculture on the environment in Croatia, the regulatory responses undertaken to limit these effects and support environmental sustainability, and actions taken for the sector in climate change adaptation and mitigation, with particular attention to the role of the CAP 2023-27.

Key messages

- The state of Croatia's natural resources is good despite multiple pressures from agricultural activities. The country, endowed with rich ecosystems, has a large share of land under conservation or natural forest cover, abundant water resources, with low pressure from pesticide application on biodiversity and soils.
- Surface water quality remains an important area requiring attention, as are ammonia emissions, which have been on the rise over the last decade. Improvement of nutrient management is needed to attain the country's 2030 national target for these emissions. GHG emissions from agriculture have decreased since the fall of Yugoslavia.
- The Common Agricultural Policy (CAP) regulates agri-environmental practices, complemented by multiple strategic documents and plans that address other national, European and international commitments.
- The new 2023-27 CAP Strategic Plan (CSP) includes several types of measures oriented towards climate and environmental objectives, particularly voluntary eco-schemes, rural development interventions, and enhanced mandatory conditionality requirements, with a key focus on crop diversification, organic farming, and animal welfare.
- Substantial CSP funding has been allocated to organic farming and to eco-schemes, which are expected to support environmental ambitions, improve nutrient management, and combat soil erosion. The high share of protected land can help protect biodiversity and support other environmental objectives.
- Agriculture is at the centre of Croatia's adaptation efforts. The 2023-27 CSP focuses on agricultural insurance and improving the public irrigation infrastructure. It will be important to monitor and measure progress in this area.
- In the absence of a specific climate mitigation plan for agriculture, CSP policy interventions are the main instrument driving mitigation efforts. There is scope to reduce on-farm fossil fuel use, increase the sector's use of renewable energies, and further develop the bioeconomy.
- The forestry sector has the potential to enhance mitigation efforts by increasing the carbon sink without compromising other objectives. Mitigation measures may increase the opportunity costs for forest owners if less biomass were to be extracted, which a revision of current management plans should clarify.
- Overall, Croatia appears well placed in terms of its agri-environmental policy package and prospects. However, several challenges remain, in particular concerning the implementation of existing strategies and plans, and the monitoring of policy progress against environmental and climate objectives.

3.1. Key environmental objectives and institutional framework of environmental regulations

Croatia's ecosystems are amongst the richest in Europe, with a large share of land protected or under forest cover. The country is rich in water resources. Nonetheless, pressures from agricultural production still pose certain challenges, with issues related to water quality, persistent level of ammonia emissions, and soil erosion. The sector is also a stable but significant contributor of greenhouse gas (GHG) emissions. These trends are increasingly taken into consideration for the regulation of the agricultural sector.

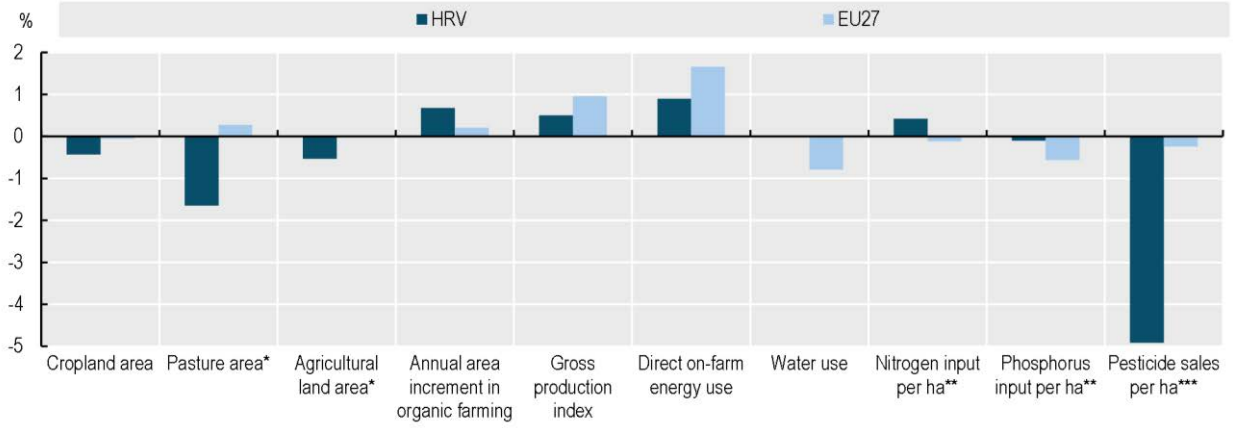
3.1.1. Context and objectives

The use of some agricultural inputs has decreased in a context of declining farmland

Overall output figures illustrate the increase in yields in Croatia. Gross agricultural production has shown a slight increase over the past decade (0.5% per year over 2011-21), while cropland decreased by 0.4% annually (Figure 3.1). Pasture area also decreased since 2013 at -1.6% annually.[1] Overall, between 2013 and 2021 the area devoted to agriculture decreased by -0.5% per year, whereas it remains stable on average in the European Union.

Figure 3.1. The use of most inputs declined except on-farm energy and nitrogen

Average annual change in selected agri-environmental indicators in Croatia and the European Union, 2011-2021



Note: The annual changes are calculated as a trend on the full time series – geometric trend for most cases (percentage change), except for organic farming that is based on an arithmetic trend (annual increment). * Trend for Croatia as from 2013 due to a 2013 change in methodology accounting of pasture. ** Trend based on 2011-2019, due to a lack of reported data after 2019. *** Trend for Croatia as from 2013 in absence of data before 2013.
Source: OECD Agri-environmental indicators (OECD, 2023[1]).

The use of agricultural inputs over the period 2011-21 varied depending on the type of input. Whereas water use and phosphorus input per hectare (ha) remained generally stable, on-farm energy use increased by 0.9% per year (compared to 1.7% overall in the European Union), and nitrogen input per ha increased by 0.4% per year (versus -0.1% at EU level). In sharp contrast, pesticide sales decreased by an average of 4.9% per year. This decline is partly explained by the expansion of organic farming, which increased from 2% of the utilised agricultural area in 2011 to 8% in 2021.

In this context, government policies were designed to maintain natural capital and keep some of the positive trends, while mitigating other adverse impacts. Article 3 of the Constitution of the Republic of

Croatia states “conservation of nature and the environment” as part of the “highest values of the constitutional order”. Sustainability and resilience to climate change is the second of the four objectives laid out in the national Agricultural Strategy until 2030 (Croatian Parliament, 2022[2]), which aims to better align national policies with the objectives defined by the European Green Deal, the Farm to Fork and the Biodiversity strategy for 2030 at the EU level. The National Development Strategy until 2030 also defines some more specific direction under its Strategic Objective 9 on “Food self-sufficiency and development of bioeconomy”. Among the priorities listed are increase in productivity, contribution to climate neutrality, reduction of pesticide use, and expansion of organic farming. The Common Agricultural Policy (CAP) Strategic Plan (CSP) of Croatia for the period 2023-27 reflects several of these objectives (Ministry of Agriculture, 2022[3]).

3.1.2. Governance of agriculture and forest environmental sustainability

The institutional framework governing environmental policy changed after a merger of ministries in 2020

Policies on agriculture, forests and the environment in Croatia are mainly managed by two institutions: the Ministry of Agriculture and the Ministry of Economy and Sustainable Development. The Ministry of Agriculture manages all administrative activities related to the sectors of agriculture, fisheries and forestry. It also co-ordinates measures for rural development, regulates the management of agricultural land, and is in charge of sanitary and phytosanitary policy as well as for veterinary and food safety issues (see also Section 2.1.3).

The Ministry of Economy and Sustainable Development (MESD) was established in 2020 following a merger of the Ministry of Economy and the Ministry of Environmental Protection and Energy in order to “reconcile the economy with sustainable development” (OECD, 2021[4]). This Ministry defines the overall environmental protection and nature conservation strategy, in coherence with the sustainable development strategy for the whole economy, and defines the climate change mitigation and adaptation strategy. Among others, it oversees agencies for water management, natural parks, and the Environmental Protection and Energy Efficiency Fund.

Several environmental institutions operate independently but are under the responsibility of the MESD. They include the Croatian Environment Agency (which collects and manages environmental data), the State Institute for Environmental and Nature Protection (which monitors and assesses the state of nature and oversees nature conservation and protection), and the state-owned company Croatian Waters (in charge of water resource and flood risk management).

Public forests, which represent 76% of all forests in the country, are managed by the state-owned company Croatian Forests (*Hrvatske Šume*), a limited liability company established by the Law on Forests. The Minister of Agriculture represents the government of Croatia in the company’s assembly.

The Paying Agency in Agriculture, Fisheries and Rural Development (*Agencija za plaćanja u poljoprivredi, ribarstvu i ruralnom razvoju* – APPRRR) implements agricultural policy. It is in charge of the administration of the Common Agricultural Policy funds and of other national programmes and measures. The agency performs administrative and on-the-spot controls of beneficiaries of the CAP measures to verify that they meet all rules and requirements, including cross-compliance[2] (see also Section 2.1.3). The control and penalty system is also implemented by APPRRR, in collaboration with the Croatian Agency for Agriculture and Food (HAPIH) and the State Inspectorate, following Croatia’s CSP.

Compliance with other regulations is controlled by the State Inspectorate. This agency enforces regulations and standards and conducts inspections in a wide range of environment-related areas, including environmental protection, nature protection, water resources, forestry and hunting, energy, mining, and toxic chemicals. The agency releases annual reports on these controls, but these are not specific to the farming sector.

There is a comprehensive agri-environmental legal framework, which has expanded following EU accession

The main texts of relevance regulating the impacts of the sector on the environment are the Laws on Agriculture, Environmental Protection, Natural Protection and Climate Change (Box 3.1).

Box 3.1. Main legislation and strategies regulating the impacts of agriculture on the environment

The Law on Agriculture (2018, last revision in 2022) determines the agricultural policy objectives. Among the stated objectives are the sustainable management of natural resources and the development of an environmentally-friendly agriculture. Measures covered by this law include payments under the CAP and possible specific state aids. The text also transposes the CAP's cross-compliance requirements, including restrictions on grassland conversion and conservation of land under growing condition, and rules defining organic farming based on EU regulation.

The Law on Environmental Protection (2013, last revision in 2018) defines general environmental protection principles, lays out the environmental domains to protect – air, waters, forest, sea, soil and the Earth's rock crust, protected plant and animal species, and nature – and defines protection rules against pollution. It initially established an independent Environmental Protection Agency and a series of basic documents to be produced to support sustainable development and environmental protection:

- The Sustainable Development Strategy (latest version from 2021 as "National Development Strategy").
- The Environmental Protection Plan (a draft version of this Plan for 2016-23 was submitted for public consultation in 2016 but never formally adopted).
- The Environmental Protection Programme adopted at the regional level (by counties and major cities).
- The State of the Environment report (latest version 2022 for the period 2017-20).

These reports are now produced by the Ministry of Economy and Sustainable Development (MESD), following the integration of the Croatian Agency for Environment and Nature (HAOP) to the Ministry of Environmental Protection and Energy in 2019 and the 2020 merger of the latter with the Ministry of Economy.

The Law on Nature Protection (2013, last revision in 2019) defines protection rules for natural habitats and transposes two related EU directives on the conservation of natural habitats and of wild fauna and flora (Directive 92/43/EEC), and on the conservation of wild birds (Directive 2009/147/EC). The text notably implements the modalities of protection under Natura 2000 areas. It defines the Nature Protection Strategy and the related Action Plan (latest version for these documents date from 2017 for the period 2017-25).

The Law on Climate Change and Protection of the Ozone Layer (2019) frames the modalities of action for climate change mitigation, adaptation and protection of the ozone layer consistently with related EU directives. It defines the following key documents in support to climate change action and the ozone layer protection:

- The Low Carbon Development Strategy (published in 2021), and the related Action Plan.
- The Climate Change Adaptation Strategy (published in 2020), and the related Action Plan.
- The Integrated National Energy and Climate Plan (published in 2019).
- The Climate Change Mitigation, Adaptation and Ozone Layer Protection Programme.

3.1.3. Agri-environmental measures in the context of the CAP

The CSP addresses environmental objectives through eco-schemes, rural development interventions...

The CSP of Croatia for 2023-27 reflects some of these objectives, even if the top needs identified in the plan are of an economic nature (see also Section 2.3). The CSP aims to tackle several environmental and climate challenges faced by the agricultural sector. In particular, it foresees new rules for the protection of organic matter and carbon content in the soil, to support climate mitigation efforts, improve water quality, and enhance biodiversity. This subsection provides clarification on some of these elements.

As detailed in Section 2.3.3, Croatia selected eight eco-schemes for farmers willing to go beyond the minimum requirements. They relate to improved crop rotations, use of nitrogen fixing crops (e.g. legumes), maintenance of landscape features, use of organic fertiliser on arable land, extensive grazing, and use of practices reducing soil erosion. Other eco-schemes also support the reinforcement of buffer zone protections along watercourses, and a 10% share of agricultural areas cultivated with practices supporting biodiversity conservation and restoration.

Environmental considerations are addressed through Pillar 2 rural development interventions. Environmental, climate-related and other management commitments (Article 70) will be supported with EUR 496 million of EU and national funds (27% of the rural development budget). Almost half of the funding in this category will support the conversion and maintenance of organic areas (Section 3.2.3). Other relevant rural development interventions include support for animal welfare practices, measures to reduce the use of protection agents on perennial plantations, and the protection of endangered native livestock breeds.

Rural development measures under the CSP support the construction of public irrigation infrastructure and an increase in the use of energy from renewable sources in agricultural production and processing. Table 3.1 summarises all relevant interventions included in the CSP.

Table 3.1. CSP measures with the largest funding include crop diversification, organic farming, and animal welfare

Croatia's 2023-27 CSP interventions with environmental and climate relevance

	Total budget (EUR million)
Pillar 1 interventions	
Eco-schemes	
Intensified diversity of agricultural land	198.2
Use of manure on arable land	74.3
Minimum share of legumes of 20% within agricultural areas	67.4
Grazing on pastures	48.4
Conservation agriculture	37.5
Preservation of grasslands of great natural value	29.8
Application of organic fertilisers in permanent plantations	7.6
Intensified maintenance of ecologically significant areas	5.2
Pillar 2 interventions	
Environmental, climate-related and other management commitments (Article 70)	
Organic farming	237.8
Animal welfare	155.5
Reduction in the use of protection means in perennial plantations	41.8
Preservation of endangered autochtonous breeds of domestic animals	38.9

	Total budget (EUR million)
Support for conservation, sustainable use and development of genetic resources in agriculture	11.8
Preservation of landscape features	5.2
Preservation of biodiversity and the environment on permanent grasslands and arable land	2.9
Preservation of extensive orchards and olive groves	2.7
Investments (Article 73)	
Use of renewable energy sources	30.0
Non-productive investments in agriculture for nature and the environment	20.4
Reconstruction (conversion) of degraded forests	11.8
Investments in irrigation (Article 74)	
Support for public irrigation systems	72.4

Note: The budget includes EU funding and national co-financing of Pillar 2 measures. Some additional forestry investments directed to the commercialisation of forest products are not listed here.
Source: Adapted from Ministry of Agriculture (2022[5]).

...and mandatory conditionality requirements for farmers

The enhanced conditionality of the 2023-27 CAP requires beneficiaries to fulfil environmental and animal welfare regulations and good practices. Unlike the eco-schemes, conditionality is mandatory for farmers. It comprises the Statutory Management Requirements (SMR), or the main EU legislation on the environment, public health, plant health and animal welfare that all farmers must respect independent of whether they receive CAP payments, as well as nine standards for Good Agricultural and Environmental Conditions (GAEC).

While the addition in the 2023-27 CAP of new GAEC standards and improvements to the previous ones point to an increase in environmental ambition, actual progress will depend on their implementation by Member States, as they may select the practices required and use exemptions (Münch et al., 2023[6]). Croatia decided to use the flexibility allowed for the implementation of GAEC 2 (protection of wetlands and peatlands) and will postpone it until 2025 (Ministry of Agriculture, 2022[3]). While some Member States chose to include additional GAEC standards at the national level, Croatia did not use this option. Table 3.2 summarises Croatia's implementation of the GAEC standards.

APPRRR is the competent authority for the implementation of conditionality, working with the State Inspectorate and the Croatian Agency for Agriculture and Food (HAPIH) for the performance of inspection and control tasks (Section 3.1.2).

In early 2024, an EU-level discussion about the flexibilisation of certain conditionality rules was launched. It responded to social movements by EU farmers facing difficulties related to temporary factors (extreme meteorological events, high input prices, inflow of products from Ukraine due to the war) and new reform proposals in the context of the EU Green Deal. In this context, a regulation granting a partial exemption from the rules of GAEC 8 for 2024 was adopted in February,[3] and in March the European Commission proposed changes to other GAEC standards (European Commission, 2024[7]). These decisions give Member States more flexibility to decide on the scope of the implementation. An online survey to gather views from farmers was opened in March 2024, with results published in the summer of 2024. The proposed actions had not been adopted at the time of drafting of this report.

Table 3.2. Croatia adapted some GAEC standards and used flexibility to adjust them to its context

GAEC standards in Croatia's 2023-27 CSP

Standard	Changes from 2014-22 CAP	Croatia's choices and differences from 2014-22
GAEC 1: Maintenance of permanent grassland	New, previously covered under greening. The ratio of permanent grassland must not decrease by more than 5% with respect to 2018.	No specific exemptions or adjustments made.
GAEC 2: Protection of wetland and peatland	New standard. Restrictions have been extended on all agricultural land in the perimeter of peat and wetlands, including no drainage. There is no ban on ploughing or the conversion of the land.	Due to the lack of detailed and precise data on the locations of wetlands and peatlands, Croatia requested a postponement of implementation until 2025 while the necessary mapping is conducted.
GAEC 3: Prohibition of stubble burning	Continuation of GAEC 6. Bans the burning of arable stubble, except for plant health reasons.	No specific exemptions or adjustments made, no change from previous period.
GAEC 4: Buffer strips along water courses	Continuation of GAEC 1. Buffer strips should now have a minimum of three meters; no pesticide and fertiliser application allowed (previously no minimum requirement was set).	While still meeting the minimum EU requirements, Croatia will apply lower restrictions on fertiliser use than in 2014-22 as rules allow narrower buffer strips in small catchments.
GAEC 5: Tillage management	Originates from GAEC 5 but with more specific consideration of the slope as a key factor regarding soil erosion risk.	Stricter requirements on the slope gradient threshold with a slope of 13% or more against 15% or more in the previous period. Same required tillage practices and land uses.
GAEC 6: Minimum soil cover	Originates from GAEC 4 but is more explicit on the need to protect soils in periods that are more sensitive.	No specific exemptions or adjustments made, no change from previous period.
GAEC 7: Crop rotation on arable land	New, but integrates elements of previous greening payments concerning crop diversification.	There were no crop rotation standards in the previous period. Rotation will be mandatory for all holdings with 10 hectares or more of arable land (except when over 75% is grassland).
GAEC 8: Non-productive features or areas	Originates from GAEC 7 and integrates elements of the greening measure for Ecological Focus Areas.	Croatia will implement the "eco-scheme top-up" option, under which farmers receive payment under an eco-scheme for going beyond the minimum requirement.
GAEC 9: Permanent grassland in Natura 2000 sites	New. Bans converting or plowing ecologically sensitive permanent grassland within the perimeter of Natura 2000 sites.	No specific exemptions or adjustments made.

Source: Authors, based on Ecorys, Metis and Agrosynergy (2023[8]) and Ministry of Agriculture (2022[5]).

3.2. Management of natural resources and ecosystems

3.2.1. Biodiversity and ecosystems

Croatia is richly endowed in biodiversity and its nature is in a good conservation status, but significant challenges remain

Croatia is amongst the countries with the richest ecosystems in Europe as it is at the junction of three different biomes (continental, alpine, and Mediterranean) and many types of habitats − mountains, forests and marine. The country is a migratory route for many species of birds and hosts one of the highest plant diversity of all European countries, as well as many endangered species (European Environment Agency, 2013[9]). As a country with a high level of biodiversity, the challenges it faces in developing its agriculture sector in this context are different from other countries which have a lower level of biodiversity.

In general, nature is in a relatively good state of conservation. Ninety-five per cent of wooded areas, which cover 47% of the land area, are in a state of natural composition, which is outstanding relative to the rest

of the European Union and even by global standards (Section 3.6). Croatia hosts 76 habitat types as defined by the EU Habitat Directive, which represents one-third of all habitats protected by the directive. Thirty-nine per cent of these habitats have good conservation status (against an EU average of 15%), although 21% are in bad conservation state (EU average 36% (European Environment Agency, 2020[10]). Species richness is an asset for agriculture in Croatia, which benefits from several native breeds, also subject to conservation objectives (Box 3.2).

In spite of this overall good environmental state, biological and landscape diversity are affected by habitat loss and fragmentation resulting from several anthropogenic activities, including agriculture, infrastructure development, invasive alien species, pollution, urbanisation, and climate change. Habitat degradation and fragmentation, poaching, and pesticide use particularly threaten mammals (Convention for Biological Diversity, 2023[11]). Forest ecosystems are affected by many factors, including pollution, inappropriate water management, land conversion to agriculture and infrastructure, fragmentation, forest fires, and uncontrolled cuttings in private forests. Although beneficial for the economy, the large influx of tourists – 21 million visitors in 2019, i.e. five times the country's population – brings additional pressure on biodiversity, notably through the introduction of alien species or diseases harmful for autochthonous species (Ministry of Agriculture, 2022[3]).

Box 3.2. Native livestock and poultry breeds in Croatia and conservation policy

Native breeds (also known as autochthonous or indigenous) are those that originate from, have adapted to, and are used in a particular geographical region (FAO, 2012[12]). The importance of native livestock breeds is recognised from several viewpoints: they maintain the diversity of animal genetic resources and are frequently valued from social, economic, and cultural perspectives (Ovaska et al., 2021[13]).

The status of native is conferred in Croatia on breeds of domestic animals that originated on the country's territory and have genetically adapted to one or more traditional production systems or to one or more environments (Croatian Parliament, 2018[14]). The "National programme for the preservation of autochthonous and endangered breeds of domestic animals 2021-25" sets the guidelines for the preservation and sustainable use of these breeds, including measures for conservation in their original environment (*in situ*) and *ex situ*. The list of native and endangered domestic animal breeds includes 28 breeds of cattle, horses, donkeys, pigs, poultry, sheep, and goats, 14 of which have been categorised as "endangered" and 5 as "critically endangered" (Ministry of Agriculture, 2023[15]).

Several programmes use EU and national funds to support the *in situ* conservation of native breeds of livestock and poultry. Both the 2014-22 Rural Development Programme and the 2023-27 CAP Strategic Plan provide support in the form of payments per livestock head to compensate for the loss of income and additional costs of breeding and keeping native breeds. In addition, several smaller programmes funded from the national budget support breeding programmes and breeders' associations (see also Section 2.4.2).

The national network of gene banks collects animal genetic material for the *ex situ* conservation of native breeds. At its centre is the National Domestic Animal Gene Bank, managed by the Ministry of Agriculture. Recognised gene banks that are part of the network include those managed by the Croatian Agency for Agriculture and Food (HAPIH) and some breeders' associations. At the end of 2022, the central gene bank had collected more than 25 000 genetic samples of native livestock breeds (Ministry of Agriculture, 2023[15]).

Note: In addition to livestock and poultry, the national programme also covers seven breeds of dogs and one of bees that are part of the list of native and endangered domestic animal breeds.

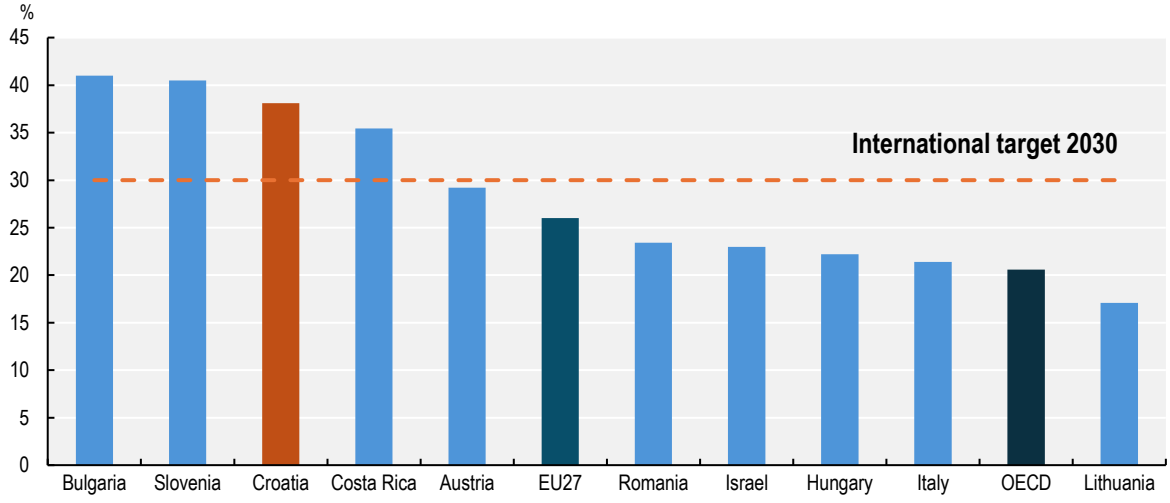
Croatia has designated a large share as protected areas in an effort to mitigate environmental pressures

To mitigate human pressures on natural ecosystems, Croatia has relied on an extensive deployment of protected areas. The share of protected terrestrial areas was 38.1% in 2021 (Figure 3.2), the fifth highest among EU Member States (for an EU average of 26%), placing the country well above the Kunming-Montreal target of 30% by 2030 (European Environment Agency, 2023[16]). These protected areas are largely (64%) Natura 2000 sites,[4] exclusively designated under the EU Birds Directive and the Habitats Directive after Croatia's 2013 EU accession. The rest is also generally designated as Natura 2000 areas, but primarily protected through national laws (national parks, parks of nature). Croatia has the largest share of agricultural area (including grassland) in Natura 2000 protected zones in the European Union (26%), over twice the EU average of 11%. The country ranks fourth in the share of forest area under Natura 2000 with 46% coverage (against 23% in the European Union).

Even though the large share of protected areas is encouraging for conservation efforts, there remains a gap when it comes to management plans for designated areas. The Habitats Directive requires the creation of Special Areas of Conservation within the Natura 2000 network, with more specific nature protection measures. To date, Croatia has achieved little in this regard (European Commission, 2022[17]). Furthermore, despite many national projects supported by EU funds to set up management plans for Natura 2000 designated areas and develop reporting and monitoring systems, the European Commission noted that more efforts are needed to efficiently address the most notable pressures, including from agriculture. Very large gaps remain, in particular in the monitoring of bird species. According to the last conservation report for 2013-18, only 10% of the breeding species and 11% of key wintering species showed increased or stable population trends, whereas trends for most of the other species were unknown (European Commission, 2022[17]). Data on the Farm Bird Index and the Forest Bird Index have been collected since 2016 only, which makes it difficult to use them as reliable indicators of trends at this stage (European Commission, 2020[18]).

Figure 3.2. Croatia is well above the international target share of protected areas

Share of protected terrestrial area in 2021 in Croatia and selected countries and regions



Note: The international target corresponds to the Target 3 of the Kunming Montreal Biodiversity Framework that establishes that 30% of terrestrial area should be protected by Parties to the Convention on Biological Diversity by 2030.
Source: European Environment Agency (for EU countries) (2024[19]) and OECD (2023), Agri-Environmental Indicators.

3.2.2. Agricultural land management

Land abandonment and agricultural intensification threaten some important habitats

As indicated in Section 3.1.1, there has been a trend of a slight decline in Croatia's agricultural land, at a rate of -0.5% per year between 2011 and 2021. Nevertheless, arable land has remained stable at around 930 000 ha since 2013. With the depopulation of rural areas, there is a trend of land consolidation in the sector and an intensification of farming practices. Over the period 2013-20, the share of the utilised agricultural area (UAA) farmed with high input intensity[5] has increased from 33% to 52%, while the UAA farmed with low input decreased from 33% to 24% (European Commission, 2023[20]). The share of high nature value areas[6] is high (61-80% in Eastern Croatia, 81-100% in Adriatic and North-West Croatia), but extensive cropland and agricultural mosaics have been threatened by this process of land consolidation and agricultural production intensification, with consequences for biodiversity depending on these ecosystems (European Commission, 2020[18]). The share of unutilised agricultural land has halved since 2007, and was around 2% in 2020. Landscape features[7] are relatively sparse, representing only 0.7% of the UAA, while fallow land represents only 1%, well below the 10% target set in the Farm to Fork Strategy (European Commission, 2020[18]).

In this context, grassland is at particular risk. Due to depopulation, many permanent grasslands are not maintained or maintenance is minimal. Karst pastures, which are abundant with rare species, require grazing for their maintenance, and their flora and fauna are affected by abandonment (Box 3.3). Despite the significant extent of area designated as Natura 2000, the slow implementation of management plans limits access of Croatian farmers in these areas to several CAP support schemes. According to Croatian reporting under the EU Habitats Directive for 2013-18, only 27.6% of grassland habitat types currently have favourable conservation status, whereas 58.6% are in poor or bad conservation state, and the status for 13.8% is unknown. The situation is even more dramatic for wet habitats, such as peat bogs, mires and fens, two-thirds of which are in bad condition, 11% in poor condition, and the rest unknown.

In 2020, 9% of the agricultural area was under management contracts under the Rural Development Plan to support biodiversity protection and/or landscape features. This was above the initial target set for the country (8%), but well below the EU average of 18%.

Box 3.3. The importance of karst landscapes in Croatia and the role of agriculture

The geology of Croatia is characterised by the presence of karst, which occupies about half of its land area. Karst is a landscape associated with carbonate rocks, such as limestone and dolomite. The soluble nature of the underlying rock creates features such as sinkholes, caves, enclosed depressions, disappearing streams, and springs (Encyclopaedia Britannica, 2024[21]). In Croatia, the karst area runs along the Adriatic coast and is part of the wider Dinaric karst complex, which extends to neighbouring countries (Matas, 2006[22]).

Karst ecosystems are rich in biodiversity: their physical heterogeneity often creates specialised habitats for rare or endemic species. At the same time, they are very sensitive to human activities. Preserving habitat diversity in karst depends on the maintenance of vegetation and soils, which tend to be thin and vulnerable to erosion. Water also flows quickly through karst with little filtration. Therefore, pollutants that enter a karst aquifer, including from agriculture, are rapidly transported, creating water quality problems.

In Croatia, an estimated 115 573 hectares of karst pastures are classified as agricultural land, and over 70% of this area is appropriate for grazing (Bakić, 2021[23]). At the same time, this area has been affected by land abandonment (see also Chapter 1). The decrease of livestock production and the

growth of grassland vegetation has led to increased risk of fires and endanger biodiversity (Kutnjak, Leto and Rajčić, 2022[24]). For example, in the area of the Dinara Mountain, pastures traditionally used for grazing are largely neglected, becoming overgrown and losing their natural values and biodiversity (Dinara back to life, 2024[25]). Overgrazing, however, can also promote the degradation of the karst ecosystem. A study of North Adriatic karst pastures found that both heavy grazing and abandonment caused a loss of plant richness and a decrease in above-ground biomass, and found low-intensity grazing to be the most appropriate way to manage these grasslands from a conservation and biodiversity perspective (Škornik, Vidrih and Kaligarič, 2010[26]).

3.2.3. Organic farming

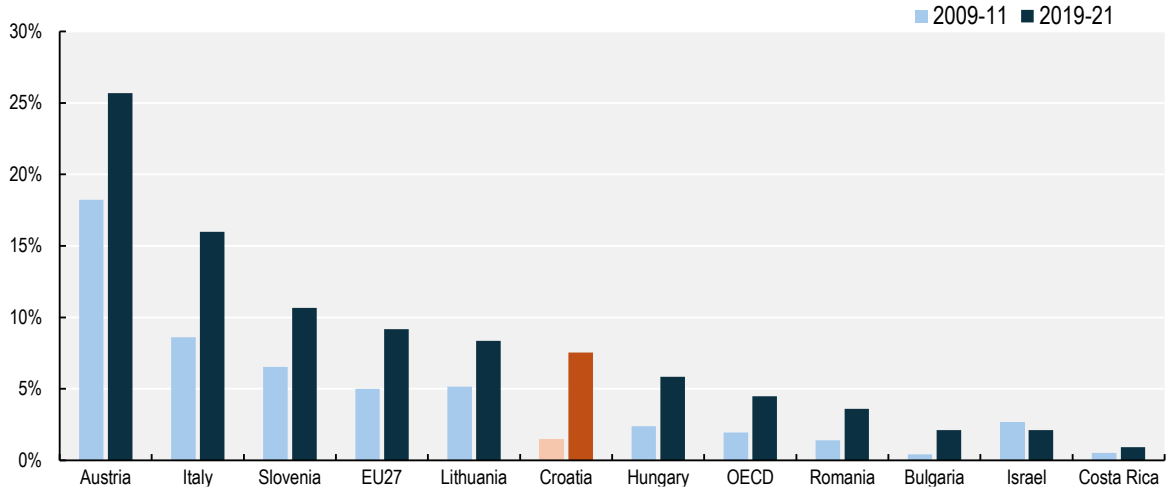
Support policies have had an important role as drivers of the organic farming expansion

The development of organic farming has been particularly fast over the past decade (see also Section 1.3.3). In 2009-11, only 1.8% of the country's UAA was under organic farming but this share reached 7.5% by 2019-21 (Figure 3.3), slightly below the national goal of 8% of the Action Plan for the Development of Organic Agriculture 2011-16. The area continues to grow since then: data from the Croatian Bureau of Statistics show a further increase in 2022, to 129 374 hectares, or 8.95% of the UAA. This share is above the average OECD level of 4.6%, but remains below the EU average of 9.7%. Furthermore, the EU Farm to Fork strategy initially set an objective of 25% across the European Union by 2030, which represents an important gap for Croatia.

Eurostat data indicate that the areas under conversion to organic farming have decreased since 2016, which suggests that an inflexion point may have been reached. Over 90% of the organic area receives support from the European Union's Common Agricultural Policy (CAP), and agricultural support may have played a preponderant role over demand effects to explain the conversion to organic farming of some specific activities (hazelnuts, walnuts, pasture) (European Commission, 2020[18]).

Figure 3.3. The area share under organic farming has increased significantly, but is still below the EU average

Share of organic farming in utilised agricultural area, Croatia and selected countries and regions



Note: Organic area includes land fully converted and under conversion.
Source: Research Institute of Organic Agriculture FiBL (2023). Key indicators on organic agriculture worldwide, https://statistics.fibl.org/world/key-indicators.html (accessed in October 2023).

As indicated above, support to organic farming has been chosen as a key measure of CAP Pillar 2 for 2023-27, with a dedicated budget of EUR 238 million. This intervention is expected to contribute to the CAP strategic objectives of climate change action, environmental care, landscape and biodiversity preservation and food and health quality protection. It provides an annual payment per hectare to support the transition and maintenance of organic farming for arable crops, vegetables, perennial crops and permanent lawns, with the objective of increasing the organic area share to 14% by 2030 (Ministry of Agriculture, 2022[3]).

Additional CAP funding will be provided for organic producers under the rural development measure for investments in farms, which supports investments in facilities and equipment for the application of organic fertilisers. The new eco-scheme "Application of organic fertilisers in permanent plantations", added in the first revision to the CSP in November 2023, also seeks to encourage the use of organic production methods in vineyards, olive groves, orchards, and mixed perennial plantations (Ministry of Agriculture, 2023[27]).

At the national level, the strategic orientation for the development of the sector is provided by the National Action Plan for the Development of Organic Agriculture for 2023-30, approved in August 2023. The Plan lays the foundations for supporting the entire organic value chain, from securing adequate ecologically acceptable raw materials to the placement and sale of certified products on the market. It also aims to encourage the development of accompanying activities such as processing, promotion, and sale through different channels, including tourism.[8]

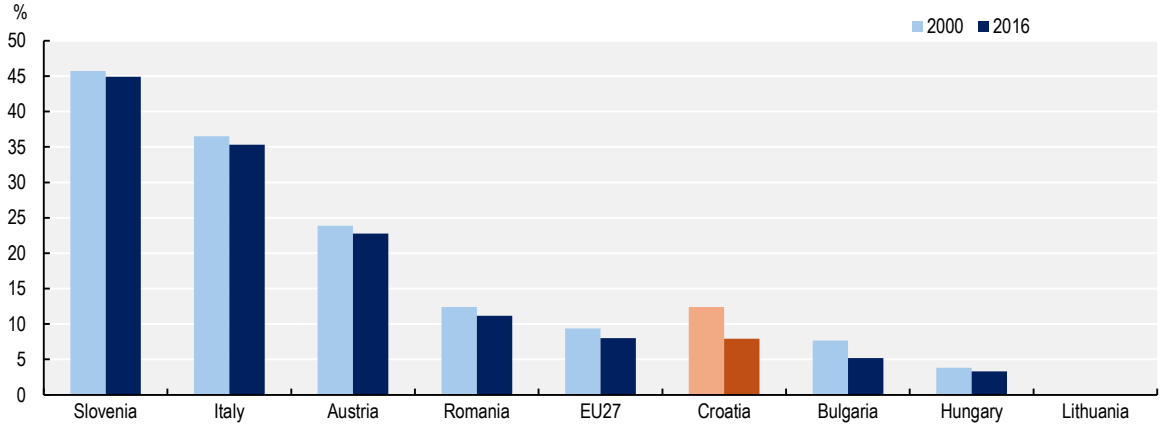
3.2.4. Soil health

The overall soil erosion situation has improved, but there are important regional variations

Due to its location and climate, Croatia is highly exposed to soil erosion risks and certain areas have suffered substantial soil losses. The European Joint Recent Centre (JRC) estimated a rate of soil loss by water in agricultural areas and natural pasture of 3.5 tonnes per hectare for 2016 (similar to the EU average). The JRC estimated that changing land use and management practices contributed to reduce this erosion by about a quarter over the past decades, as the rate was of 4.7 tonnes per hectare in 2000. Similarly, the share of agricultural land severely degraded is estimated to have greatly decreased, from 12.4% in 2000 down to 7.9% in 2016 (Figure 3.4).

Figure 3.4. The rate of erosion in agricultural soils has improved since 2000

Estimated share of agricultural soils severely affected by water erosion in Croatia and selected countries

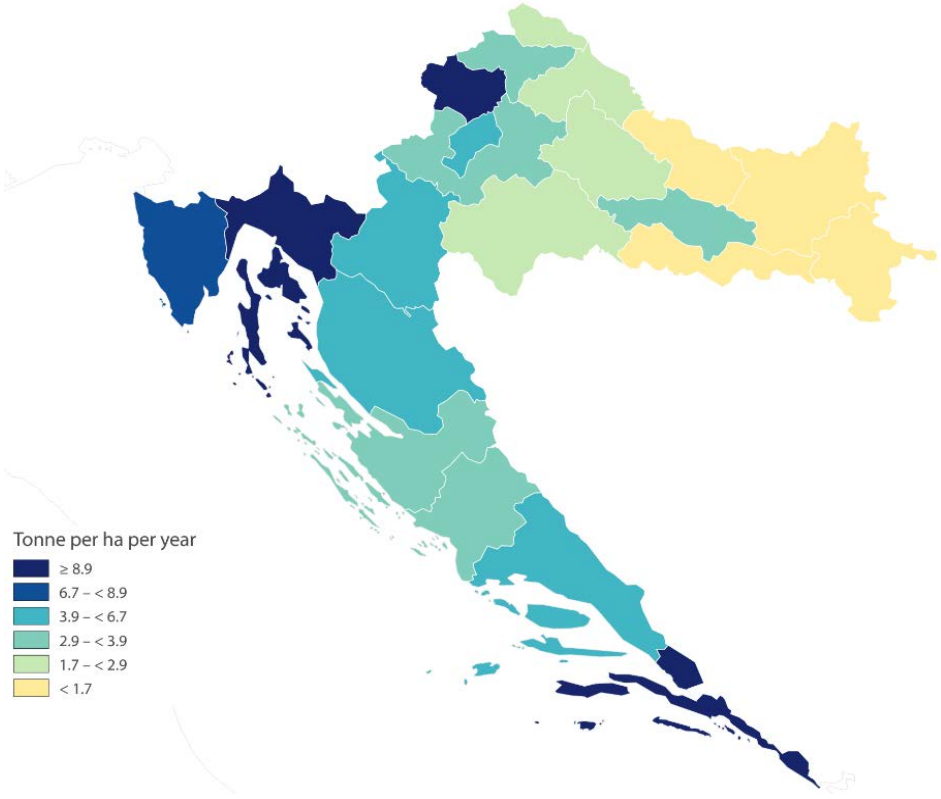


Note : Areas are classified as severely affected by water erosion if erosion rate exceeds 10 tonnes per hectare per year.
Source: Eurostat (2024) – Estimated soil erosion by water [aei_pr_soiler].

Notwithstanding the overall improvement, there is significant variation in regional erosion patterns, with the coastal area more exposed, as illustrated in Figure 3.5. About 20% of agricultural area and natural grassland was affected by moderate or severe erosion from water (>5 t/ha/yr), slightly above the EU average (18%). The most severely affected areas represented 151 700 ha of agricultural land areas (without pasture), and 37 400 ha of natural grassland, which represents about 8% of each land class, similar to average patterns in the rest of the European Union (Figure 3.4).

Figure 3.5. Soil erosion patterns show significant regional variation

Estimated soil erosion by water in Croatia at NUTS 3 regional level (2016)



Note: Administrative boundaries: © Eurographics; Cartography: Eurostat – IMAGE; 01/2024.
Source: Eurostat (2024), Estimated soil loss by water erosion by land cover type [aei_pr_soiler].

Conventional tillage, which is widespread in Croatia, and the absence of winter cover crops exacerbate soil erosion pressures in the country (European Commission, 2020[18]). About 90% of arable land continued to be cultivated under conventional tillage in 2016, a stable level since 2010. This was well above the EU average of 68%, with only two other EU Member States[9] having higher use of full tillage. Conversely, no-till was only found on 0.5% of areas compared to 3.8% in the rest of the European Union. More than 55% of arable land was left bare during the winter in 2016, the largest share in the European Union and far above the EU average (24%). This share was also up by 10% compared to 2010.

The mean organic carbon content of Croatian soils in 2018 was 28 g/kg, slightly above the EU average of 24 (European Commission, 2023[28]). Soil salinisation due to natural and anthropogenic drivers has also been identified as problematic in certain coastal regions. This affects soil quality, but also irrigation potential (see Box 3.3 on the specificities of karst systems). Croatia is one of thirteen EU Member States that have declared to be affected by desertification under the United Nations Convention to Combat Desertification (European Court of Auditors, 2018[29]).

Soil data is currently dispersed and non-centralised, as it is collected by different institutions, with a lack of systematic soil monitoring. Some actions in this area are foreseen in Croatia's Recovery and Resilience Plan (RRP)[10] (see also Section 2.4.1) as part of the measures for the restructuring and consolidation of agricultural land (measure C1.5. R2). One of the reforms that has been implemented is the new Law on the consolidation of agricultural land, adopted in April 2022, which foresees the creation of an information system on consolidated land and a soil quality database (Government of the Republic of Croatia, 2022[30]). The RRP plans an investment of EUR 1.7 million to establish by 2025 a network of 90 permanent stations for the monitoring of agricultural land across the country. This will enable the collection and analysis of soil samples and provide the necessary data for the evaluation of the soil condition. The first point for monitoring agricultural soil was established in July 2023 under the responsibility of the HAPIH's Soil Centre (Croatian Agency for Agriculture and Food, 2023[31]).

Better soil management objectives are integrated both in the National Strategy for Adaptation to Climate Change, in order to improve production resilience, and in the Low-Carbon Development Strategy until 2030, with the goal of enhancing soil organic carbon and protect mineral carbon in organic soils.[11] In 2020, over 9.1% of agricultural land in Croatia was under contract to improve soil management or prevent soil erosion (European Network for Rural Development, 2021[32]).

Specific measures to improve soil management have been integrated to the CSP of Croatia as one area of action. Several eco-schemes have been designed, covering prevention of soil degradation, soil restoration, improvement of soil fertility, and better nutrient management. For instance, EUR 74 million are reserved for the use of manure on arable land, whereas EUR 67 million will be devoted to a minimum share (20%) of legumes planted on agricultural areas. Conservation agriculture is allocated EUR 37 million. Several GAEC standards are dedicated to improving soil management, such as GAEC 5 on tillage management, GAEC 6 on minimum soil cover, and GAEC 7 on crop rotations. In addition, EUR 20 million are dedicated to non-productive investments (specifically, construction of terraced plots, construction of external dry walls, hedges) which should also prevent soil erosion.

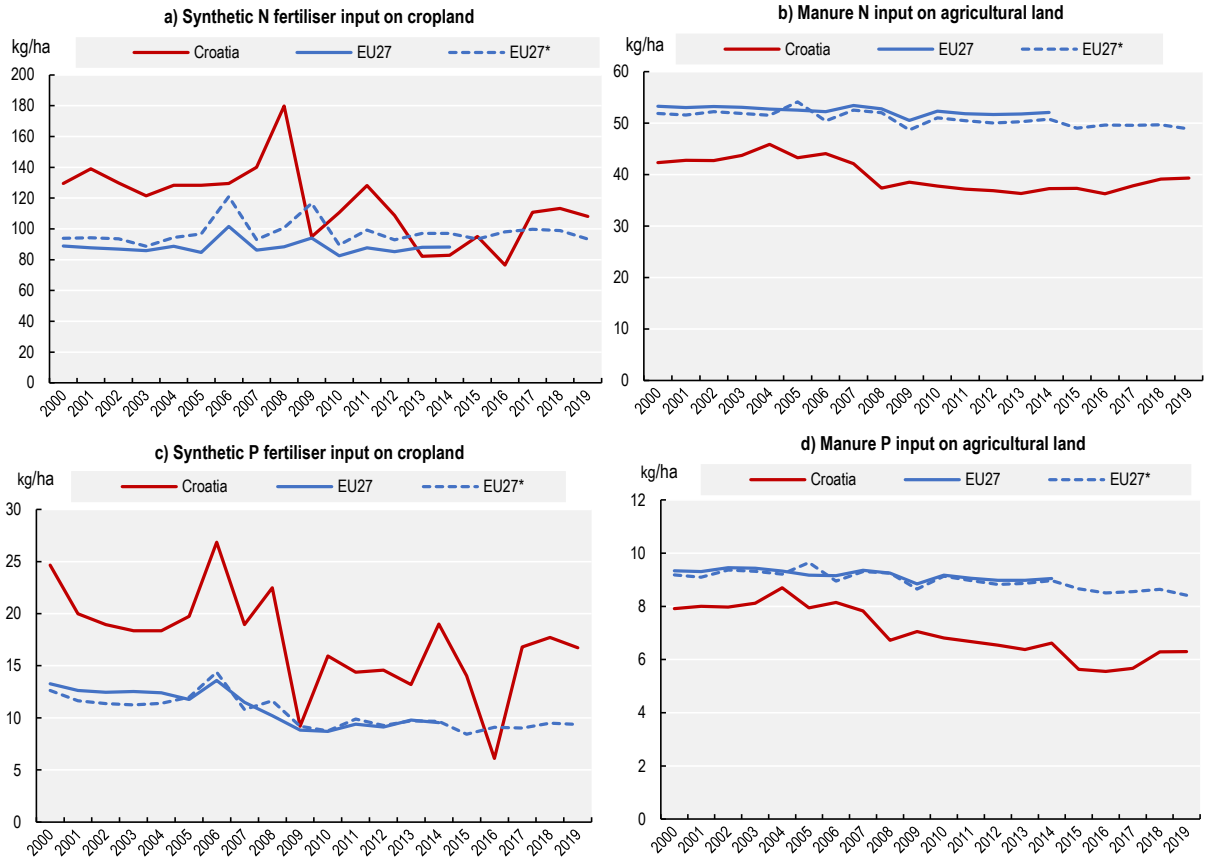
3.2.5. Fertiliser input and nutrient balance

The input of synthetic fertilisers has declined but remains relatively high, particularly in the case of phosphorus

As the share of high input farms increased over the past years, the average input expenditure increased from EUR 268 to EUR 321 per hectare between 2013 and 2020, but remains below the EU average (European Commission, 2023[33]). The application of synthetic nitrogen (N) fertilisers has decreased since 2000, when it was over 40% higher than the EU average. Application levels have reached a level closer to other Member States in the last decade, even if it has slightly rebounded according to the latest data in 2017-19 (Figure 3.6, panel a). The input of nitrogen through manure input has slightly decreased and is 20% below EU average level (Figure 3.6, panel b). Phosphorus (P) application levels through synthetic fertilisers remain on average much higher than the practice in the rest of the European Union, often exceeding it by 30% or more (Figure 3.6, panel c). However, the input of phosphorus from organic fertiliser is considerably below the EU average and decreasing (Figure 3.6, panel d), which has contributed to a reduction in total nutrient inputs for phosphorus. This can be partly attributed to restructuring in the livestock sector, which has been through a decrease in the number of animals – both ruminant and monogastric – since 2010.

Figure 3.6. The input of synthetic fertilisers has decreased, but remains above the EU average

Input of synthetic fertiliser and manure in Croatia and rest of the European Union (kg per ha per year)

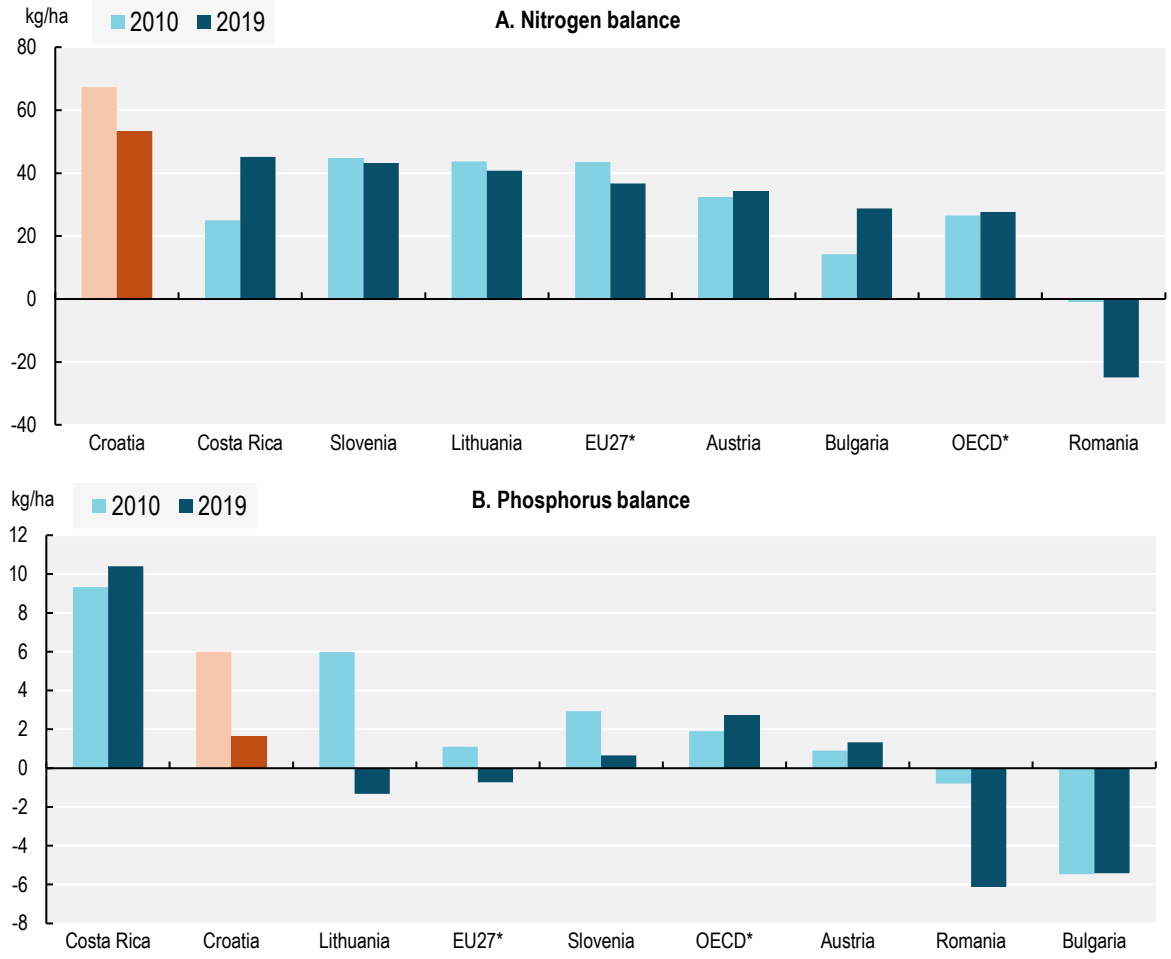


Note: * EU27 extended series (benchmark) is based on 16 EU Member states with data available for the full period: Austria, Bulgaria, Croatia, Czechia, Germany, Finland, France, Latvia, Lithuania, the Netherlands, Poland, Portugal, Romania, Slovakia, Slovenia and Sweden. These represent around 67% of the nitrogen input, and 65% of the applied synthetic phosphorus in the European Union.
Source: OECD (2023), Agri-environmental indicators (database).

The nutrient balances have improved over the past decade as a result of the decreases in fertiliser application and improved nutrient use efficiency. Nitrogen surpluses decreased from 67 kg/ha in 2010 to 53 kg/ha in 2019, approaching the EU average (50 kg/ha for the European Union as a whole in 2015, and 37 kg/ha in 2019 for countries with data) but still exceeding the levels of peer EU countries (Figure 3.7). In the case of phosphorus, in 2010 Croatia had one of the highest surplus of the peer group (over 5 kg/ha), but with 1.6 kg/ha in 2019, the country is now closer to the average levels observed across the EU and the OECD. Nonetheless, and in spite of an overall good quality of water resources in Croatia (Section 3.3), the impact of diffuse pollution from agriculture is visible on surface- and groundwater bodies, especially in the continental part of the country belonging to the Danube River Basin. Overall, 43% of Croatia's surface water bodies and 6% of groundwater are affected by nutrient excess pollution. Furthermore, although the quality of groundwater is generally considered good, Croatia has a relatively high proportion of eutrophic or hypertrophic rivers and lakes (European Commission, 2020[18]).

Figure 3.7. Nutrient surpluses are lower, but remain above the EU average

Nutrient balances in Croatia and in selected countries and regions



Note: The EU benchmark is calculated based on 16 EU Member states with data available for the full period: Austria, Bulgaria, Croatia, Czechia, Germany, Finland, France, Latvia, Lithuania, the Netherlands, Poland, Portugal, Romania, Slovakia, Slovenia and Sweden. These represent around 67% of the nitrogen input, and 65% of the applied synthetic phosphorus in the European Union. The OECD benchmark is based on 24 OECD Members. In addition to EU OECD countries listed above are also accounted: Australia, Canada, Colombia, Costa Rica, Iceland, Korea, Mexico, New Zealand, Switzerland, Türkiye and the United States.
Source: OECD (2023), Agri-environmental indicators (database).

3.2.6. Ammonia emissions

Lower livestock numbers drove a decrease in the ammonia emissions intensity after 2008, but recent performance in this area has deterioriated

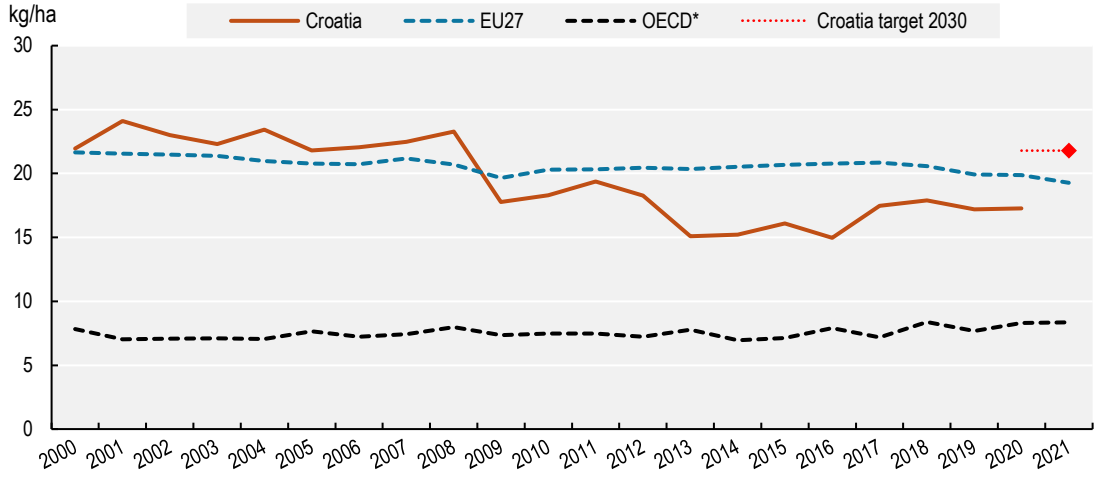
Nutrient inputs into agricultural soil generate air pollution by ammonia (NH_3) through volatilisation, which in turn pollutes soil and water through deposition, or forms aerosols harmful to human health. Agriculture is the main contributor to ammonia emissions in Croatia. In 2018, the sector was responsible for 81% of NH_3 emissions, even if this is below the EU average contribution from the sector (93%) due to the relatively lower livestock density. The intensity of ammonia emissions in agricultural land was higher than the EU average up to 2008, but the reduction in animal numbers drove it below the EU average after 2009 (Figure 3.8). At the same time, the level of emission intensity remained above the average level observed

in the OECD.[12] Furthermore, the trend of NH_3 emissions reductions stopped in 2013 and reverted to an upward trend after 2016.

Due to the decreased performance in ammonia emissions reductions, Croatia faces challenges to meet its current commitments. Between 2014 and 2019, the country exceeded its 2010 national emission ceiling for NH_3 (European Environment Agency, 2021[34]), reporting the highest percentage exceedance (23%) after Spain.[13] While current NH_3 emissions are below Croatia's National Emission Ceiling Directive reduction commitment for 2020-29, reviews commissioned by the European Commission have found a medium risk of non-compliance for the period 2020-29 as well as for 2030 and beyond (European Commission, 2020[18]).[14]

Figure 3.8. The ammonia emission intensity in agriculture is below the EU average, but has increased in recent years

Ammonia emissions intensity per hectare of agricultural land, Croatia and selected regions



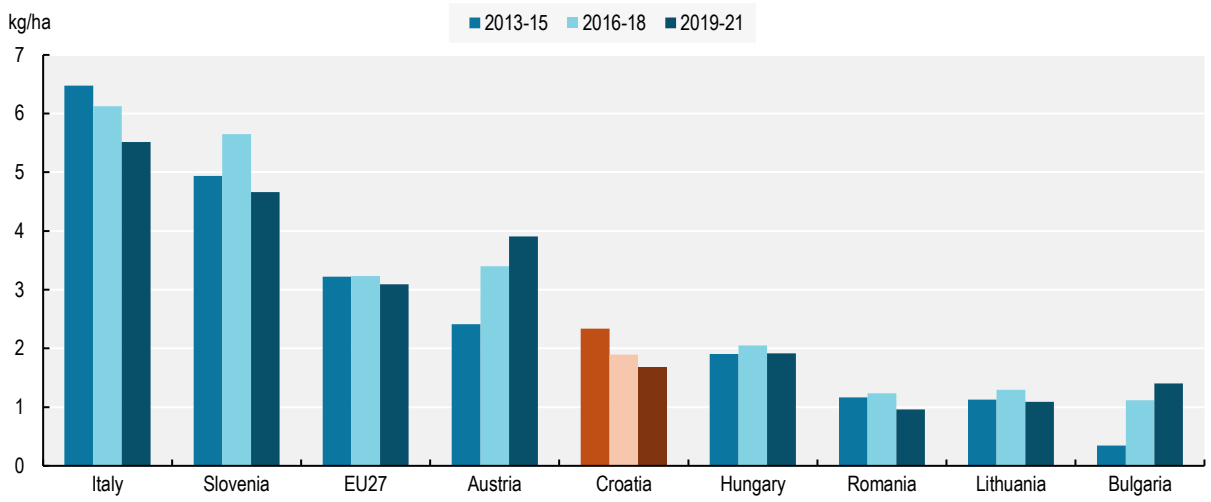
Note: * OECD average excludes Mexico and Chile due to data gaps.
Source: OECD (2023), Agri-environmental indicators (database).

3.2.7. Plant pests and diseases control

A strong decline in sales of pesticides following EU accession

Pesticide sales in Croatia have decreased relatively fast over the past decade (-4.9%) compared to the rest of the European Union (-0.2%) and other Members of the OECD.[15] Purchases in 2019-21, at 1.7 kg of active substance per hectare, were 28% below their 2013-15 level (Figure 3.9). This is also 46% below the average observed level in the European Union, as well as in the rest of the OECD.[16] This decreasing trend was confirmed in 2021 and 2022, the years with the lowest levels of pesticide sales in the country since 2013. Pesticides sold in 2022 were mainly herbicides (48%) and fungicides (40%), with smaller shares of insecticides (6%) and plant growth regulators (5%). The largest decreases since 2013 have been observed in fungicides (-36%) and insecticides (-33%).

Figure 3.9. Pesticide sales per area of arable land in Croatia and selected regions



Source: OECD (2023), Agri-environmental indicators (database).

Croatia has also improved in terms of the toxicity of the substances purchased. Between 2013 and 2021, the Harmonised Risk Indicator 1[17] (for all active substances) decreased by 57%, against a decrease of only 33% on average in the European Union (Eurostat, 2024[35]).

Some of these trends may be attributed to the evolution of the legal framework following EU accession. Croatia published in 2013 its first National Action Plan to achieve the sustainable use of pesticides for 2013-23, as requested under the Directive 2009/128/EC on the sustainable use of pesticides. Between 2013 and 2015, sales of several specific products declined with the decision of non-approval or non-renewal of a number of active substances, following the implementation of EU standards (EU Regulation 540/2011).

The domestic legal framework was updated in April 2022 with the adoption of a new Law on the Sustainable Use of Pesticides, which replaces previous legislation in this area. The new law aims to achieve a sustainable use of pesticides, reduce their risks and negative effects, introduce the mandatory application of the basic principles of integrated plant protection for the control of harmful organisms and encourage the use of non-chemical plant protection measures (Government of the Republic of Croatia, 2022[36]). The law requires that all professional users, distributors, and advisors attend training to acquire satisfactory knowledge of the safe handling and proper application of pesticides. It also introduces the use of electronic credentials to connect to the Phytosanitary Information System for the verification of the status of professional users, distributors and advisers (Ministry of Agriculture, 2023[37]). This new law responded to a number of concerns expressed by the European Commission at the time of adoption of the Farm-to-Fork strategy (European Commission, 2020[18]), and led to the adoption of a rulebook with additional conditions for pesticides in 2023. The 2013 National Action Plan, however, is still to be revised.

3.2.8. Animal disease control and welfare

Use of veterinary antimicrobial agents was reduced, but more progress is needed on animal welfare

The sale of veterinary antimicrobial agents has steadily decreased since 2014. They represented 56.2 mg per population correction unit (PCU)[18] in 2022 compared to 103.5 mg/PCU in 2014, a decrease of 46%. This is lower than the average EU level of 75.8 mg/PCU[19] (European Medicines Agency, 2022[38]), which also went through a drastic reduction over the same period (-51%). At the EU level, the Farm to Fork

strategy has set a 50% reduction target in the sales of antimicrobials for farmed animals and in aquaculture by 2030. To further support such evolution, Croatia established in 2023 a mandatory training programme for animal farmers supported by CAP direct payments, part of which will cover antimicrobial resistance issues and alternative solutions. The European Commission has identified a need to upgrade farm biosecurity and to revise and upgrade registration of certain farms, animal identification and animal movements to ensure biosecurity and resilience to possible disease outbreaks (European Commission, 2020[18]).

The European Commission monitors specific animal welfare issues. A problematic routine practice in Croatia is the tail docking of pigs, which is prohibited as a general practice in the European Union, but remains common in the country: the percentage of pigs reared with intact tails has not increased since 2016 (European Commission, 2020[18]). Furthermore, an on-site audit in 2018 revealed that ship approval and inspection processes could not guarantee the compliance with EU regulation on welfare associated with animal transportation (European Commission, 2018[39]).

New legislation has been passed over the past years to improve animal welfare. The 2013 Law on the implementation of European Union regulations on animal protection was revised in 2019 to tighten some modalities related to certification and inspection. A new law on animal protection was also passed in 2017 to prescribe the responsibility and obligations of natural and legal persons for the protection of animals, which includes the protection of their life, health and well-being, including during keeping, breeding, performing procedures on animals, killing, and transportation for the case of the agricultural sector. A Law on Animal Health was approved in 2022, to complement existing Laws on veterinary medicine and on veterinary-medical products. Animal welfare measures were added to the Rural Development Plan of Croatia in 2018 and have been consolidated through the 2023-27 CAP Strategic Plan, with a total public funding allocation of EUR 155 million, i.e. almost 9% of the Pillar 2 budget.

3.3. Water management policies

3.3.1. Context and governance

Water management is undertaken by several agencies at the national and regional levels

Croatia has abundant water resources, albeit unevenly distributed across its territory. The North and Eastern part of the country belong to the Black Sea catchment area, with long and abundant water flow – the Danube River being the most illustrative example. The Adriatic catchment areas on the western and southern parts have shorter water streams and more irregular water runoffs. Furthermore, as the karst occupies about half of the territory (Box 3.3) and has less capacity for water accumulation, the possibility of building up water reserves to manage critical dry periods is limited (Ministry of Agriculture, 2022[3]) (OECD, 2015[40]). However, the country is regularly hit by flooding events with serious economic costs (OECD, 2020[41]). The number of lakes is limited and wetland areas cover 0.3% of the territory (Eurostat, 2024[42]).

Water management responsibilities are undertaken by the Ministry of Economy and Sustainable Development for policy orientations, two specialised agencies at the national level for management and monitoring, and the regional and local governance units for implementation. More specifically, the Water Agency *Hrvatske vode*, established by the Water Act of 2009, is in charge of River Basin Management Plans, the regulation of water uses, including irrigation, and the protection of the resource. The Water Institute (*Josip Juraj Strossmayer)*, which is under the authority of the Ministry, is in charge of monitoring the resource and of scientific analyses.

3.3.2. Use of water for irrigation

Croatia has a very small share of land under irrigation and plans to invest in the construction of public irrigation infrastructure in 2023-27

Only 29 670 ha of agricultural land (1.9% of Croatia UAA) was equipped with irrigation infrastructure in 2016. However, since irrigation and drainage equipment are not in good condition, the effectively irrigated area in the same year was only 16 070 ha (1% of UAA). These shares are well below the EU averages of 9% and 6% for equipped and irrigated areas, respectively (Eurostat, 2019[43]). In 2005, the government launched the National Project of Irrigation and Land and Water Management in the Republic of Croatia (NAPNAV). According to these plans, irrigation potential was estimated at 244 000 hectares (ha). The plan sought to expand irrigated areas to 65 000 ha by 2020, building irrigation infrastructure for a total cost of EUR 396 million (Holjevic, Marusic and Romic, 2007[44]). These plans were compromised by the 2009 economic crisis and irrigation projects implemented under the 2014-20 Rural Development Programme covered only 7 457 ha of agricultural land, with 11 additional projects covering 9 948 ha in the pipeline and the construction of an irrigation canal with the aim of increasing irrigation capabilities and enriching small water resources in the area of western Slavonia (European Commission, 2020[18]; Ministry of Agriculture, 2024[45]).

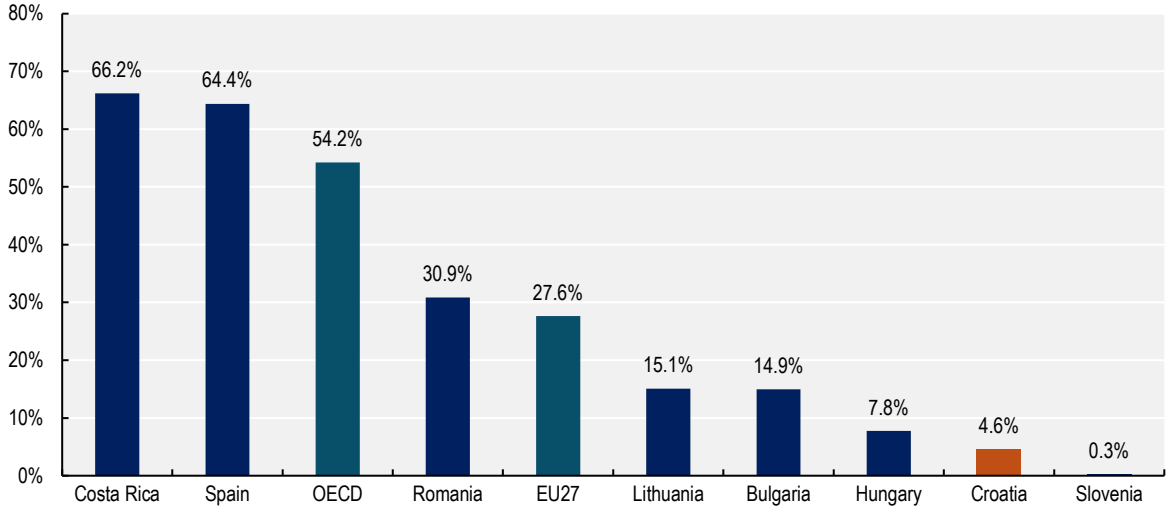
The 2023-27 CAP Strategic Plan foresees a budget of EUR 72 million from Pillar 2 for new investments in public irrigation systems. These interventions will support the construction of public systems to enable the supply of water to agricultural plots (as opposed to on-farm systems directly on users' plots) and is intended to lead to an increase in the net irrigated area. The infrastructure supported includes reservoirs, pumping stations, pipelines, distribution networks, and monitoring and control systems. Systems that obtain water from alternative sources (e.g. rainwater collection) will also be supported, but the use of treated wastewater for irrigation will not. Priority will be given to investments in undeveloped areas, areas with lower than average rainfall, or irrigation systems with a higher economic rate of return and in suitable soil. The investments must be compatible with River Basin Management Plans in accordance with the requirements of the EU Water Framework Directive that also protects the quantitative status of water bodies. Water metering is required and projects in areas with less than good water quantity status are not eligible (Ministry of Agriculture, 2022[3]).

Current regulation of water use for irrigation is managed by the Water Agency (*Hrvatske vode)*, which delivers water use permits and sets fees according to the volume of abstracted water. A water permit specifies the entitled user, the allowable amount of water and the period of application, the purpose and conditions for water withdrawal, as well as the measuring and modality of control of the quantity abstracted. The costs borne by farmers do not include the full opportunity cost of water, just the irrigation costs corresponding to the water abstraction fee, the operating and maintenance costs, and an administrative fee.

The availability of aggregated data on agricultural water use and irrigation in Croatia is limited, and historical data on the volume of water abstraction for agriculture is not available. Nonetheless, it is estimated that irrigation represents only around 5% of all water abstractions in 2020 (Figure 3.10) versus 42% in the 36 countries monitored by the European Environmental Agency. The Water Exploitation Index (WEI+), measuring the percentage of water use against renewable freshwater resources was estimated at 0.361 in 2017 (European Environment Agency, 2020[46]). This is the fifth lowest of the 36 EU and non-EU countries covered by this indicator.

Figure 3.10. Water abstraction for agriculture is low

Share of freshwater abstraction for agriculture, Croatia and selected countries and regions, 2020



Note: For OECD countries not reporting data for 2018, closest year was used to estimate the average.
Source: Eurostat (2024) for EU Member States (code : env_wat_abs) and OECD Stat Agri-environmental indicators (2024) of others.

3.3.3. Water quality and agriculture

The quality of water has declined as a consequence of pollution from agriculture

As highlighted in the previous section, the quality of water has declined from the past high level of input use in Croatian agriculture. The country has a relatively high proportion of eutrophic or hypertrophic rivers and lakes. Furthermore, 60% of surface waters are in less than good ecological status, and 8% in less than good chemical status. Groundwater is in better state, with only 3% not in good ecological status and 9% failing on good chemical status (European Commission, 2020[18]). Agricultural nutrients are among the most significant sources of pollution of surface water bodies (43% of surface bodies affected) and of groundwater (6%), with pollution most substantial in the continental part of the country in the Danube River Basin (*ibid*).

In response to these pressures, the government has implemented several successive Action Programmes with the goal of implementing measures to protect water from agricultural nitrate pollution and prevent further degradation of the water resources. The CAP instruments have been used to promote better practices, in particular the Statutory Management Requirements (SMRs) 1 and 2 targeting phosphate and nitrate pollution, and the Good Agricultural and Environmental Conditions (GAECs) 4, 5, and 6 on water and soil protection. The 2014-22 Rural Development Plan was used to further support the reduction of diffuse pollution, with over 11.8% of agricultural land in Croatia under contracts to improve water management in 2022. The new CAP eco-schemes also give a large budget for better nutrient use, notably EUR 74.3 billion for the use of manure on arable land, while Pillar 2 interventions devote EUR 237.8 billion to organic farming, which could bring further nutrient management benefit depending on the practices adopted. Under the Water Framework Directive, Croatia is required to monitor the ecological status of its water bodies and to develop national level indicators to support this assessment.

3.4. Climate change adaptation efforts

3.4.1. Agriculture and forestry exposure to climate change

Agriculture is experiencing the impact of climate change, with the 2022 drought a significant example

Like in many countries, Croatian agriculture is vulnerable to climate change. The Croatian Meteorological and Hydrological Service (DHMZ), which is in charge of meteorological and hydrological forecasts, studies climate evolution and performs long-term modelling to better understand the changing patterns for the country. Temperatures have been increasing in Croatia over the past 60 years, and the occurrence of hot days and heat waves is expected to increase, with risks of exacerbated drought events, water shortages and wildfires. Historically high temperatures were recorded in the summer of 2022, with 3.0-4.3 degrees above the historical average (1981-2010). The number of dry periods in Croatia has increased for all time scales, by up to 60%, and has doubled in the Northern and Central Adriatic regions on a 12-month basis. In addition to the immediate consequences of the lack of precipitation, this creates long-term jeopardy for lakes and underground water reserves due to the limited accumulation capacity of the karstic region. Conversely, a more frequent occurrence of intense precipitation episodes increases the risk of floods and runoffs associated with more severe erosion and possible landslides (Ministry of Economy and Sustainable Development, 2020[47]; Climate-ADAPT, 2023[48]).

These changing climate patterns have consequences for agriculture. Vegetative periods of arable crops (in particular cereals and oilseeds) are affected, with higher water demand and overall anticipated yield reductions of 3-8% for current crops in Croatia by 2050. Fruit and vegetable crops (apples, grapevine, olives) are already affected with shorter vegetative periods, in particular in regions like Slavonia and Dalmatia. Risks of crop losses are also higher, with a greater occurrence of severe droughts, storm winds, floods, hail or fire episodes. Drought alone caused between 2013 and 2016 around HRK 3 billion (EUR 400 million) of damage to the sector in Croatia; and the damage from the 2022 summer drought episode was EUR 300 million (Ministry of Economy and Sustainable Development, 2020[47]; Climate-ADAPT, 2023[48]). The European Environmental Agency considers Croatia as one of the EU Member States with the highest cumulative share of damages from extreme weather and climate events in relation to the gross national product (Ministry of Agriculture, 2022[3]). A lack of groundwater and an increase in air temperature are perceived as the main challenges for the future of agriculture in Croatia, although new opportunities could emerge with the possibility to grow crops with longer vegetative periods.

The forestry sector is also highly exposed. The fire season is longer and more intense. The phenological phases of tree species are also affected, with an earlier start of vegetation and longer vegetation seasons depending on species and habitats, which impact species migration but also patterns of distribution of pests, including invasive species. Some forest ecosystems, such as oak forests, could face decreased productivity, whereas broader ecosystems damages could result from forest fires, strong winds increase occurrence, icing events, floods or pest attacks, reducing the quality of wood varieties and affecting the overall services provisioning of forests (Climate-ADAPT, 2023[48]).

3.4.2. Adaptation strategy of Croatia

Agriculture accounts for nearly half of the estimated national adaptation funding requirements The National Strategy for Adaptation to Climate Change by 2040 acknowledges that agriculture and forestry are among the sectors most exposed to climate change and defines response measures to better adapt these sectors to this threat. Eight measures have been defined for agriculture:

- Implementation of the climate change adaptation experimental-research programme in agriculture (P-01).

- Increasing the water absorption capacity of agricultural soil (P-02).
- Application of appropriate soil tillage methods (e.g. soil conservation tillage and other methods of reduced soil tillage) (P-03).
- Cultivation of species and varieties of agricultural crops for food and non-food supply chain and breeds of domestic animals that are more resilient to climate change (P-04).
- Integration of climate change risks into the development of irrigation systems (P-05).
- Application of anti-erosion measures (P-06).
- Reconstruction and construction of amelioration of drainage structures (P-07).
- Insurance of agricultural production from losses caused by adverse climatic conditions (P-08).

Among these measures, five specific actions were ranked of very high importance in the National Strategic for Adaptation (P-01 to P-05), and two of high importance (P-06 and P-07).

Twelve climate adaptation measures specific to forests have also been developed. These include: increased knowledge capacity on the vulnerability and the monitoring of forest resources; strengthened capacities for forest protection; implementation of the green infrastructure concept for urban and rural areas; prediction of change to the distribution of harmful organisms; afforestation and reforestation measures; awareness raising for stakeholder and forest owners; development of risk assessment tools; exploration of possible adaptation measures for wild animals; and identification of communities and forest areas that are most vulnerable to climate change.

Ten additional measures target the improvement of water resources management, including structural and non-structural measures to adapt to potential damage from strong rainfall and flooding events, strengthened research and management capacities on the risks of extreme events, increased capacity for exploration, and sustainable management of groundwater. Other domains of action include measures on biodiversity (development of early warning systems for protected areas, preservation and application of traditional agricultural practices and knowledge for resilience of semi-natural and natural ecosystems), risk management (strengthened role for the Croatian Platform for Disaster Risk Reduction, multi-sectoral and sectoral risks assessments, integrated and standardised cross-sectoral database of threads, measures, damages and losses) and enhanced general monitoring and forecasting capacity.

The draft National Adaptation Plan estimates at HRK 27.6 billion (EUR 3.6 billion) the total amount required to implement adaptation measures for the period up to 2040. These resources are planned to come from different sources of funding: the state budget and the European Structural and Investment Funds, as well as the private sector, regional and local governments budget and national companies. Government expenditures would focus on measures and activities on public awareness, capacity building, project documentation preparation, or pilot projects, whereas larger infrastructure projects are expected to be financed by EU funds. Out of this adaptation funding needs, agriculture would require HRK 12.6 billion (EUR 1.7 billion), forestry HRK 5.2 billion (EUR 0.7 billion) and water resources HRK 5.4 billion (EUR 0.7 billion). These three domains therefore represent 84% of the estimated adaptation needs, with agriculture alone accounting for 46%. The required agriculture adaptation funding is thus roughly equivalent to the total budget of Croatia for Pillar 2 under the 2023-27 CAP.

3.4.3. Agricultural policy measures for adaptation

Agricultural insurance and irrigation are the most important policy focus areas

Measures under the Common Agricultural Policy are expected to support these adaptation objectives. The 2014-22 Rural Development Programme included several measures which can enhance adaptation capacity: better inputs and manure management, development of organic farming, preservation of the High

Natural Value grasslands, as well as non-productive investments. Many of these measures are extended with the CSP for 2023-27.

Irrigation development is an area of particular interest. The National Adaptation Plan considers boosting initial investments planned under the NAPNAV programme and targets a total of 100 000 ha of irrigated land, which the 2023-27 CSP will partly support through Pillar 2 (see Section 3.3.2 for more detail).

In the context of the Common Agricultural Policy, farmers can receive two types of support to cope with extreme events: co-financing of insurance costs before the event (Article 76 of EU regulation 2021/2115); and co-financing of eligible cost for the restoration of damaged or lost production potential after the event (Article 73). However, in Croatia only about 8% of farms (but 50% of production) are covered by insurance because the high-risk profiles related to exposure to drought and low deployment of irrigation lead to high insurance premiums (European Commission, 2020[18]). Public expenditure on agricultural insurance is relatively low: under the 2014-22 RDP it was estimated at about EUR 98 million as of end-2022. In the 2023-27 CSP, the budget for this category is EUR 70 million (4% of the Pillar 2 budget). See also Section 2.5 on agricultural risk management.

To strengthen absorptive capacity, Croatia published in 2022 its Disaster Risk Management Strategy until 2030. It defines two main objectives: i) disaster risk reduction through better prediction and prevention tools; and ii) increase of preparedness for disaster management. The Strategy is under the lead of the Ministry of Internal Affairs, but the Ministry of Agriculture is involved for the implementation of specific measures related to plant diseases, animal diseases and drought. The Disaster Management Action Plan attached to the strategy for the period 2021-24 includes the completion of 13 irrigation projects (5 400 ha) by 2024 at the latest.

Monitoring the implementation of adaptation measures has proven challenging

Croatia must report on the implementation progress in its adaptation policy and measures in the context of its EU and international obligations, monitoring adaptation performance and budgetary efforts. Counties and large cities also have the obligation to report on environmental protection programmes that require four-year action plans. However, the difficulty to establish indicators of progress on adaptation action hinders the monitoring of implementation. The National Adaptation Strategy defines a first set of possible indicators to be used in the future: production and area under irrigation, share of land sown with crops resilient to climate stress, mass of eroded agricultural soil, area of land with functional drainage, irrigation water savings achieved by specific programmes, share of land with reduced or no tillage, among others. Similar indicators are planned to be used for forests (monitoring of fire occurrence and forest status and damages). Further work is planned at the national level and in co-operation at the international and EU levels to improve the measurement of progress towards adaptation. Delays in the implementation of some measures can be a challenge for the strengthening of the adaptation capacity. For instance, in its review of the second River Basin Management Plan of Croatia (2016), the European Commission noted that the country had still to produce a drought management plan (European Commission, 2020[18]).

3.5. Climate change mitigation efforts

3.5.1. Current emissions trends for AFOLU

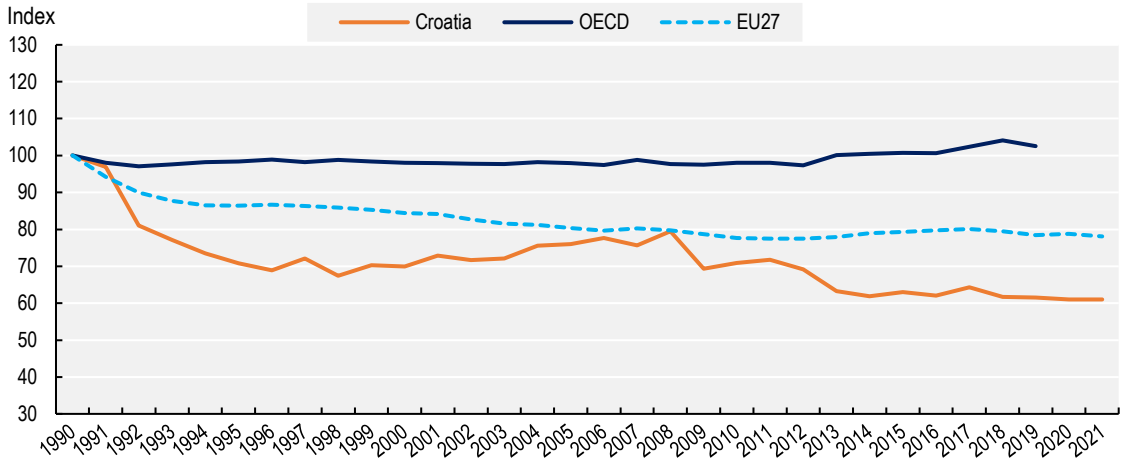
Agricultural GHG emissions have declined over the last three decades

GHG emissions in Croatia have declined significantly since the early 1990s due to the structural adjustments after the breakup of Yugoslavia. Agricultural emissions followed this trend with a decrease of 38% of GHG emissions since 1990, including a decline in the last decade driven by reduced livestock numbers (Figure 3.11). In 2021, the sector emitted 2.7 million tonnes of CO_2 equivalent ($MtCO_2$-eq) and

accounted for 11% of the total country emissions (without LULUCF). This represents an annual decline of -2% following a peak at 3.5 $MtCO_2$-eq in 2008. The objective of emissions reduction by 2030 for sectors not covered by the EU Emissions Trading System (non-ETS, which include agriculture) under the European Union's Effort Sharing Regulation were revised in 2023 from -7% to -16.7% for Croatia, compared to 2005 levels. Agriculture has already exceeded this target, with a current reduction level of -19.7%. However, this is not sufficient to compensate the lower performance of other sectors, as the overall non-ETS reduction in Croatia was only -6.1% in 2022 compared to 2005. To date, no sector-specific national target has been assigned for agriculture.

Figure 3.11. Agricultural GHG emissions have followed a declining trend since 1990

Relative change in GHG emissions from agriculture in Croatia and selected regions, 1990-2021



Source: OECD (2023), Agri-environmental indicators (database) (OECD, 2023[49]).

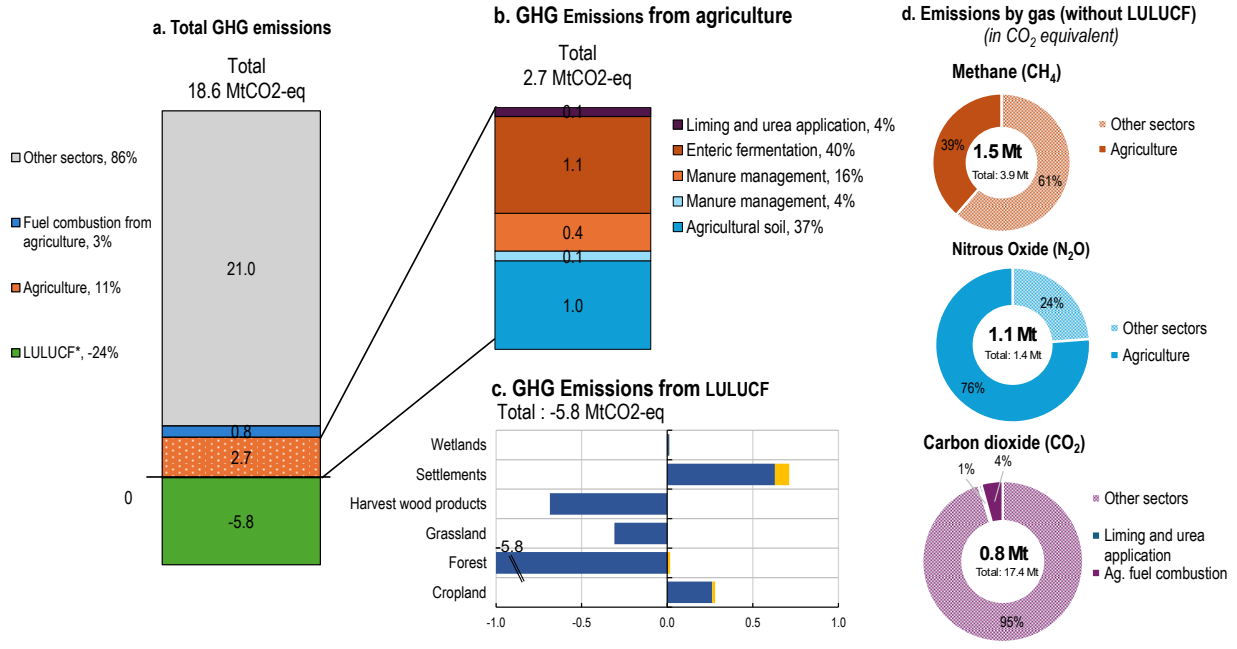
Agricultural emissions in Croatia mainly originate from livestock – methane from enteric fermentation (40%) and methane and nitrous oxide from manure management (20%). Non-CO_2 emissions from soils generate most of the remainder (37%) through nitrous oxide emissions from fertiliser application and manure deposition (Figure 3.12). Livestock emissions are at a historical low – half of their 1990 level – due to a sharp decrease in the number of animals. Only three EU Member States display trends of decreasing emissions from the livestock sector (European Court of Auditors, 2021[50]). Soil emissions have also been notably declining since the 2000s, but after reaching a minimum in 2014 they are presently on an upward trend with an increase of 2.9% per year.

It should be noted that the 2.7 $MtCO_2$-eq emissions from agriculture do not account for emissions from fuel combustion by the sector. Around 0.8 $MtCO_2$-eq is attributed to fuel combustion in agriculture, forestry and fisheries. Emissions from this source declined between 2010 and 2017, but in recent years have increased by almost 10%, which is mostly attributable to agriculture and forestry.[20]

The land use, land-use change and forestry (LULUCF) sector plays an important role in the emission budget of Croatia. Land represents a substantial sink: on average, it sequestered -5.8 $MtCO_2$ per year in 2019-21, which offsets 24% of other national anthropogenic emissions. Most of the sink is related to forest, but grassland also participates in sequestration (-0.3 $MtCO_2$/yr). Cropland represents a source (with 0.3 $MtCO_2$/yr), but this level decreased by more than 40% over the past decade, which indicates an improvement in cropland management. The forest sink has been significantly reduced over the past decades due to intensified management of forest. From 1991 to 2006, it was in the range of -7-8 $MtCO_2$/yr, but since 2016 it has not been greater than -6 $MtCO_2$/yr.

Figure 3.12. Livestock originates 60% of agricultural GHG emissions

Total and AFOLU GHG emissions in Croatia, 2021



Note: Yellow colour in the panel b, c, and d correspond to nitrous oxide emissions, red colours correspond to methane emissions, and blue colours to carbon dioxide. Fuel combustion corresponds to the sectors agriculture/forestry/fishing as per UNFCCC reporting.
Source: OECD Stat (2024) Agri-environmental indicators for AFOLU emissions, OECD GHG emission database, for total and sectoral emissions and UNFCCC (2024) for fossil fuel emissions from agriculture, fisheries and forestry.

3.5.2. Commitments for climate mitigation

Croatia undertook emission reduction commitments since signing the Kyoto Protocol and recently adopted stronger targets reflecting higher ambition at the EU level

Croatia is an Annex I Party to the United Nations Framework Convention on Climate Change (UNFCCC) and had already taken GHG emission reduction commitments at the Kyoto Protocol before aligning with the EU's policies in 2013 and becoming a Party to the Paris Agreement in 2017. Over the years, the country has produced many reports on its GHG emission trends and climate mitigation strategy as part of international and EU requirements. The 7th National Communication to the UNFCCC and the 4th Biennial Report were submitted to the UNFCCC in 2018 and 2019, respectively. The next editions of these two reports, due by the end of 2022, were still not published at the time of preparation of the 2023 United Nations Climate Change Conference (COP28).

In addition to UNFCCC reporting documentation, several other important reports were produced, providing more details on Croatia's sectoral strategies and plans. At the end of 2019, the first version of the Integrated National Energy and Climate Plan (NECP) for 2021-30 was released. In 2021, it was followed by the publication of the Low-carbon development strategy until 2030 with a view to 2050, which elaborated on a set of potential measures targeting emissions from agriculture. All government communications on climate mitigation acknowledge that agriculture plays an important role, noting the specificity of the sector as to food security and livelihoods objectives. The 2023-27 CAP budget is intended to support climate action, with 30% of the rural development budget allocated to environmental and climate measures.

With the "Fit-for-55" increased ambition at European Union level, Croatia submitted in mid-2023 the draft of an updated NECP reflecting stronger targets. This plan endorses the various commitments for Croatia, defined at EU level, including the new reduction target of -16.7% for non-ETS sectors, as indicated in the previous section. The LULUCF sector in Croatia will need to enhance its sink by about 0.6 Mt CO_2 in the period 2026-29[21] in order to contribute to the enhanced EU sink target of 310 Mt CO_2.

3.5.3. Climate mitigation measures in agriculture

Most measures for agriculture included in the most recent national plan can be closely mapped to CSP interventions

The latest version of the NECP specifies a detailed list of measures for each sector, indicating the Ministry in charge, the supervisory body, the timeline and budget and the monitoring method. In the case of agriculture, it includes ten measures, in line with the recommendations from the Low Carbon Strategy. Most of them are closely linked to the 2023-27 CSP (Table 3.3). In December 2023, Croatia submitted an updated version of the NECP to the European Commission; this list will continue to evolve, with close alignment with the latest CSP version.

Table 3.3. Planned climate mitigation measures for agriculture in Croatia

Measure number	Measure	Objective	Required budget	Synergy with CAP funding 2023-27
POLJ-1	Improving storage capacity and practices when handling manure	Reduce methane, nitrogen and ammonia emissions through the systems of manure collection and storage	EUR 4 million	Measure 73.01 for investment in primary agricultural production (EUR 224 million)
POLJ-2	Anaerobic decomposition of manure and biogas production	Reduce manure emissions from cattle and pig by increasing the share of biogas plants	Not specified	Measure 73.03 on use of renewable energy sources (EUR 30 million) Measure 73.01 for investment in primary agricultural production (EUR 224 million)
POLJ-3	Improving and changing the soil tillage system (reduced tillage)	Increase carbon sequestration through improved soil treatments	Not specified	Reimbursement of costs incurred under Measure 31.06 (eco-scheme) on conservation agriculture (EUR 7.5 million/year)
POLJ-4	Extension of crop rotation with a higher share of legumes	Determine the potential of carbon sequestration through improved crop rotation	Not specified	Reimbursement of costs incurred under Measure 31.05 (eco-scheme) on minimum leguminous content of 20% within agricultural areas (EUR 13.5 million/year)
POLJ-5	Intensification of crop rotation by using intercrops	Increase carbon sequestration and prevent nitrate leaching by sowing of intercrops	EUR 4 million	Supplement to basic income under Measure 31.01 (eco-scheme) on intensified diversity of agricultural production (EUR 39 million/year) Reimbursement of costs incurred under Measure 31.05 (eco-scheme) on minimum leguminous content of 20% within agricultural areas (EUR 13.5 million/year)
POLJ-6	Improvement of mineral fertilisers application methods	Reduce emissions of N_2O from the soil by fertiliser application techniques	EUR 7 million	Measure 73.10 on investment aids (EUR 224 million) Measure 73.12 on support for small farmers (EUR 30 million)
POLJ-7	Improvement of organic fertilisers application methods	Conduct research on the effect of organic fertiliser application improvement on soil organic carbon	EUR 20 million	Measure 73.10 on investment aids (EUR 224 million) Measure 73.12 on support for small farmers (EUR 30 million)
POLJ-8	Agroforestry	Conduct research and identify suitable areas	EUR 1 million	Measure 70.08 on preservation of extensive orchards and olive groves (EUR 2.7 million)

Measure number	Measure	Objective	Required budget	Synergy with CAP funding 2023-27
POLJ-9	Hydromelioration interventions and systems of protection against natural disasters	Increase the share of agricultural soils under irrigation and the consequent reduction of nitrate leaching from agricultural soils	EUR 15 million	Measure 74.01 on Support for public irrigation systems (EUR 72 million)
POLJ-10	Introduction of new cultivars, varieties and species	Conduct research programs on new culture of legumes	EUR 0.5 million	CAP Pillar II (details not specified)

Note: Budget estimates for the CAP measures were updated to reflect the most recent CSP data compared to those stated in the 2023 NECP. The CAP funding amounts in the right column refer to: yearly budget in the case of eco-schemes and total public funding budgeted (including both EU and national funds) in the case of rural development interventions.
Source: Integrated National Energy and Climate Plan (Ministry of Economy and Sustainable Development, 2023[51]) and 2023-27 CSP (Ministry of Agriculture, 2023[27]).

The implementation of these measures is planned by 2030 and those in the CSP have a 2027 horizon. Some additional options were not elaborated in the draft updated NECP, but are listed in Croatia's Low Carbon Strategy. They include changes in the diet of cattle and pigs and the quality of fodder; changing the livestock breeding system; improvement of breeding and selection programme, health, and welfare of animals; changing the way people eat; and collection and processing of agricultural plantations and residues for use for energy purposes.

3.5.4. Climate mitigation measures for LULUCF

Some mitigation measures in the draft national plan require clearer implementation pathways

The NECP includes similar measures targeting forestry and LULUCF activities in the agricultural sector as detailed in Table 3.4.

Other measures announced in the NECP are also relevant to the AFOLU sector. In particular: the transformation of the bioeconomy sector (MS-9); collecting and processing of biomass from agriculture, forestry, fishing and aquaculture (MS-12); the elimination of fossil fuel subsidies (MS-13), with the plan to review current regulations by 2030, including for tax exemptions granted to agriculture; carbon removal certification (MS-14), notably through carbon farming and forestry solutions; the reduction of food waste (GO-5); and the use of renewable energy sources for thermal purposes (OIE-5), which includes notably biomass use.

Table 3.4. Planned climate mitigation measures for LULUCF in Croatia

Measure number	Measure	Objective	Synergy with CAP funding 2023-27
LUF-1	Development of the maintenance plan of the National Information System for land in the Republic of Croatia	Better characterise land use categories and improve spatial data quality.	Not applicable
LUF-2	Carbon sequestration on areas of existing forests	Determine management interventions, with potential changes in logging plans, necessary to support the LULUCF target achievement by 2030	Modernisation of forestry technologies in wood extraction, forest breeding and forest reproductive material (Measure 73.06, EUR 20 million); Construction of forest infrastructure (Measure 73.08, EUR 12 million) Reconstruction (conversion) of degraded forests (Measure 73.05, EUR 12 million).
LUF-3	Implementation of afforestation works	Determine possible areas to afforest, with aspirational targets of 20,000 ha (+1%) of natural forest expansion, and possible conversion of 33 000 - 35 000 ha of shrubland to higher vegetation forms	Reconstruction (conversion) of degraded forests (Measure 73.05, EUR 12 million).
LUF-4	Manufacture and use of wood and wood products	Improve measurement and reporting of carbon storage in harvested wood products	Modernisation of technologies in pre-industrial wood processing (Measure 73.07, EUR 27 million), Promotion of forestry products and services (Measure 73.09, EUR 1 million)
LUF-5	Land under managed crops	Targets all forms of soil management intervention in agriculture that could reduce emissions and sequester carbon in the soil:	
		- Intensify maintenance of ecologically significant areas	Measure 31.03 (eco-scheme)
		- Develop conservation agriculture with a target of covering 150 000 ha	Measure 31.06 (eco-scheme, EUR 7.5 million/year)
		- Reduce land use in perennial plantations with an objective of covering 121 745 ha	Measure 70.01 (EUR 42 million)
		- Develop organic farming with an objective of covering 841 000 ha	Measure 70.04 (EUR 238 million)
		- Prevent the burning of harvest residues and support return of carbon to the soil	GAEC 3 standard (see Table 3.2)
LUF-6	Managed grassland	Reduce soil carbon losses and enhanced sequestration in grassland:	
		- Ensure the maintenance of areas under permanent grassland	GAEC 1 standard
		- Increase extensive pasture management preservation, envisaged on 122 500 ha	Measure 31.02 (eco-scheme, EUR 48 million)
		- Preserve of high nature value grassland, planned for 22 500 ha	Measure 31.07 (eco-scheme, EUR 30 million)
		- Conserve biodiversity and the environment on permanent grasslands and arable land, planned on 3 500 ha	Measure 70.02 (EUR 2.9 million)
LUF-7	Implementation of technical projects and scientific research in the LULUCF sector	Improve monitoring of land use, forest inventory and forestry markets and carry out mapping activities.	Not applicable

Note: Budget estimate by measure not available in the case of the LULUCF measures for NECP. Budget estimates for the CAP measures were updated to reflect the most recent CSP data compared to those stated in the 2023 NECP. The CAP funding amounts of rural development interventions show the total public funding budgeted (including both EU and national funds).
Source: Integrated National Energy and Climate Plan (Ministry of Economy and Sustainable Development, 2023[51]) and Croatia's CAP CSP.

The NECP considers that if all these additional measures are implemented, agricultural emissions could be further reduced by 0.3 $MtCO_2$-eq by 2030 (-11% compared to present levels). The costs associated to these measures are estimated at EUR 585 million over the period, and an additional equivalent investment is required for the period 2030-50. No cost assessment is provided for LULUCF activities, although the report notes that required funding is well below the available resources.

In its review of the updated NCEP draft, the European Commission pointed out that more details would be needed on the emission savings attributed to agriculture, linking those to specific measures and the use of EU funding. Additionally, no specific pathway was given for the achievement of the LULUCF target and the contribution of renewable energy from biomass to the climate mitigation efforts. Concrete plans were also expected as to the phase out of fossil fuel subsidies. The Commission noted that the net-zero ambition was not explicitly transposed within the overall emission objectives of Croatia (European Commission, 2023[52]). These elements must be incorporated in the updated version of the NCEP.

3.6. Forest loss, deforestation situation and policies

Forests are in a good conservation status, but their carbon sink effect has declined over the last decade

Wooded areas covered 48.1% of Croatia's territory in 2018 according to the latest EU Land Use and Cover Area frame Survey (LUCAS). These lands are composed of 56% of high forest, 14% of coppice forest, and the remainder of different degrees of degraded forest vegetation.[22] Ninety-five per cent of these forested areas is in a state of natural composition, and 73% is considered to be in good ecological condition (compared to 52% on average in the European Union); only 12% is considered to be in bad condition (Convention for Biological Diversity, 2023[11]; European Environment Agency, 2023[53]). About 4 500 plant species and subspecies, 260 autochthonous tree species, and more than 100 forest plant communities can be found within these habitats.

Management of forests in Croatia follows a long tradition, with legislation first introduced in the 18th century (Box 1.2). About 76% of forested land (and 71% of high forest and coppice low forest) was owned in 2015 by the state and largely managed by the state-owned company *Hrvatske šume* (Croatian Forest).[23] Since 2002, all state-owned forests receive a Forest Stewardship Council (FSC) certificate stating that the forests are managed according to strict sustainability standards which are regularly renewed. The remaining 24% of forests and forested land (660 000 ha in 2015) was owned by 600 000 individual private owners, most of them with forest stand of less than 1 ha (Ministry of Agriculture, 2017[54]). The share of forest covered with long-term management plans has increased over time, from 73% in 2000 to 83% in 2015, as private owners were requested to make stronger commitments and all forests are at present covered (FAO, 2020[55]).

About two-thirds (69%) of forests in Croatia are in a productive state. This share has decreased over the past decade as forest protection measures were extended. The forest area protected from management has tripled since 2010, and represents at present 13% of areas, whereas multifunctional forest has increased from 9% to 14% and conservation areas for biodiversity now represent 3% of the total forest area. When considering areas protected under Natura 2000, the share of forest and wooded land under environmental protection stands at around 45% (European Environment Agency, 2023[16]). Forest management remains impossible on 30 970 ha of land (1.1% of the forested land) that are still affected by landmines from the 1991-1995 conflict, which significantly disrupted forest management. Harvested volumes have been expanding over the past ten years in order to restore the management of part of this land, and further harvest should take place after the full completion of the demining process.

Forest management includes forest conversion and afforestation activities, but these are relatively limited compared to the full extent of forests. Between 2010 and 2017, the area deforested was always lower than 500 ha per year and did not affect more than 0.08% of the forest area. Over the same period, the afforested

area represented 0.11% of the forest area. Indeed, the forest area is more driven by natural expansion, which was ten times larger than managed afforestation, reaching 3 400 ha of new forest per year between 2015 and 2020. In addition, 900 ha of forest was regenerated per year, with reforestation following clear cuts (FAO, 2020[55]). New afforestation plans in the context of the climate policy should further support forest expansion (Section 3.5).

These managements trends have supported a growing stock of biomass over the past decades, from 360 million cubic metres (m^3) of wood over bark in 2000 to 427 million m^3 in 2020. As a consequence of this growing stock, Croatian forests have represented a significant carbon sink over the years (-5.8 $MtCO_2$ in 2021, see Section 3.5.1), even though the forest sink effect was reduced over the past decade with the increased harvested volumes, on average by 140 $ktCO_2$ per year (or 50 $ktCO_2$ per year with other LULUCF sources). With currently planned harvests, the sink associated to the forest reference level has been estimated at -4 368 $ktCO_2$ for 2021-25 (Ministry of Economy and Sustainable Development, 2019[56]).

The Croatian Government considers that the objective set in the EU LULUCF directive of increasing the LULUCF sink of Croatia by 593 $ktCO_2$ over 2026-29 is difficult to achieve, notably due to the unfavourable age structure of the forests (Ministry of Economy and Sustainable Development, 2023[51]). It would require significantly revising logging plans − while the Renewable Energy Directive also incentivises the use of solid biomass for bioenergy − and potentially converting some coppice stands into high forest, which would represent a substantial economic loss for the sector. Croatia is also closely monitoring the natural disturbances to the carbon stock associated with wildfires and other extreme events (windbreaks, snowbreaks and icebreaks). Over the period 2001-17, five years recorded a loss of carbon greater than 0.2 $MtCO_2$ due to exceptional fires, including 0.9 $MtCO_2$ in 2017 alone (Ministry of Economy and Sustainable Development, 2019[56]).

3.7. Moving towards an energy-efficient and low-carbon economy

Energy use by agriculture has increased and is projected to grow further. There is scope to reduce consumption and increase the use of renewable energies by the sector

Direct on-farm energy consumption has been relatively stable over the past 20 years. Following a slight decline after 2010, between 2015 and 2020 it increased at an average rate of around 2% to reach its highest level since 2001 at 233 kilotonnes of oil equivalent (ktoe) (OECD, 2023[57]). This represents 3% of the final energy consumption of the Croatian economy, a share similar to the European Union's (Eurostat, 2022[58]).

Over time, the mix of fuels consumed by the sector has evolved, reflecting efficiency improvements and structural changes. Consumption of petroleum products in 2020 was 6% lower than in 2010, but still represents 81% of the energy sources (FAO, 2023[59]). As indicated in Section 2.4.4, Croatia applies an exemption from the excise duty on diesel for agricultural use (European Commission, 2022[60]).

The use of other energy carriers has steadily increased. Natural gas consumption increased by 39% over the 2010-20 period, and now represents 11% of the sector's energy use, whereas the direct use of heat has been multiplied by six and now accounts for 3% of consumption. Electricity use has remained stable at 5%. These structural changes have led to a decrease in energy emissions for the sector of around -3% over the ten-year period (FAO, 2023[59]; UNFCCC, 2023[61]).

On-farm energy consumption is expected to increase further in the future due to the frequent unusually high temperatures that require the use of cooling facilities for animals or for storing fruits and vegetables. However, there is scope to reduce it through the energy renovation of agricultural buildings or by conditioning new constructions in accordance with energy efficiency rules (Ministry of Agriculture, 2022[3]).

At 3%, the share of agriculture in the production of renewable energy in Croatia is well below the EU average (12%). This is due to a low development of biofuel crops compared to other EU Member States. As a consequence, in 2022 the consumption of renewable energy in the transport sector was only 2%, which is the lowest incorporation rate in the European Union and well below the 9.6% EU average. The use of renewable energy is much larger in other sectors such as electricity (55%), and heating and cooling (37%), both well above the respective EU averages of 41% and 25%. This large renewable share in Croatia is explained by the contribution of solid biomass from forest, which accounted for 63% of renewable energy production in 2021, above the EU average of 41% (European Commission, 2023[62]).

In its observation letter to the 2021 proposal by Croatia for its CSP, the European Commission noted the low use of renewable resources from Croatian agriculture, pointing in particular to the untapped potential for developing biogas production facilities.

In September 2023, Croatia presented a draft Bioeconomy Strategy until 2035 that partly covers this domain (Ministry of Agriculture, 2023[63]). The strategy covers public policies from all sectors relevant to the bioeconomy and defines the vision and strategic goals of bioeconomy development, considering the principles of sustainable development and national development directions, development needs and potentials of the bioeconomy. In particular, it plans to identify and remove obstacles for the development of bioeconomy sectors, map the availability and biomass of the various sectors – including food and beverages, microbial biomass, wood processing, bioplastics and renewable energy – support research and innovation for the sector and foster the consumption of domestic bioeconomy products. A first step was achieved with a national Central Portal for Bioeconomy, CROBIOHUB,[24] to connect stakeholders and promote the bioeconomy, but other concrete measures have yet to be defined.

3.8. Conclusions

Croatia demonstrates an overall good state of natural resources, despite pressures on its environment from agricultural activities and other drivers. The country, which has some of the richest ecosystems in Europe, has a comprehensive set of national agri-environmental laws and regulations that cover a wide range of areas, some of which have been amended and revised several times under the impetus of accession to the European Union. Some gaps in this policy framework need to be filled and governance reviewed, however, in order for Croatia to benefit from a full and consistent package across all environmental dimensions for agriculture.

The EU CAP has framed the core agri-environmental objectives since 2013. The new 2023-27 CAP Strategic Plan (CSP) includes significant funding that is earmarked for crop diversification under the new eco-schemes, as well as for organic farming, and animal welfare. It is complemented by the Recovery and Resilience Plan (RRP) that funds better monitoring of agricultural soils. Together, these measures are meant to address the remaining challenges for the sector. However, nutrient surpluses are still above the EU average, and ammonia emissions have increased over the past ten years despite a notable reduction in synthetic fertiliser application. The 2030 national target on ammonia emissions is at risk, as well as surface water quality, if these trends continue. Support to organic farming expansion, as planned under the new CSP and the 2023 national strategy, may help improve nutrient management and combat soil erosion. Further incentives will be needed as conversion to organic farming has decelerated recently, and current trends fall short of the ambitious target of the EU Farm to Fork strategy.

In the face of climate change risks, agricultural insurance and irrigation are currently the main areas of focus for the sector's adaptation. There are plans to step up the construction of public irrigation infrastructures in 2023-27 to better use the abundant, albeit unevenly distributed, water resources. However, monitoring and measuring progress towards adaptation has proven challenging, even if a first set of indicators has been defined. Climate action will also require emission reduction efforts as the sector represents 11% of the national GHG emissions. There is at present no specific climate mitigation plan or

emission reduction target for agriculture and the 2023-27 CAP interventions are the main instrument supporting the sector's climate mitigation efforts. There is scope for further measures, as energy use in the sector is increasing and Croatia subsidises diesel use for farmers. Use of renewable energies could be ramped up and plans to develop the bioeconomy sector accelerated, as these are well behind other EU Member States.

Protecting biodiversity should remain a priority. Croatia's current conservation policy has ensured a high share of protected areas, putting the country in a leading position in the European Union and well above the Kunming-Montreal international target. However, land abandonment threatens the conservation of sensitive habitats such as karst pastures. The use of forested land has a particular role to play at the interface of biodiversity and climate policies. More forests have been put into production over the past decade. EU climate objectives require enhancing the forest carbon sink, which will pose particular challenges in terms of expected revenue loss for the sector. More detailed forest management plans are necessary to ensure a feasible path for the sector to achieve its economic, climate and biodiversity objectives.

In light of these observations, Croatia appears well placed in terms of its agri-environmental policy package and prospects, although a number of challenges remain. Many new strategy documents and plans aim to respond to international commitments and compliance requirements, but having the capacity to implement these strategies and monitor their progress is challenging and will be key for the success of the environmental objectives set for agriculture.

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Notes

[1] The methodology for pastureland statistics in Croatia was updated in 2013, therefore data for pastureland and agricultural land are only used as from that year.

[2] "Cross-compliance", also named under the new CAP "conditionality", designates the set of rules that EU farmers need to respect to receive EU CAP payments.

[3] Commission Implementing Regulation (EU) 2024/587 of 12 February.

[4] Natura 2000 sites are specific land area designated for specific conservation measures by each EU country in accordance with the EU Birds and Habitat Directives. Such measures should be designed based on the ecological needs identified, and each member state then has the responsibility of defining and implementing the site management accordingly, in cooperation with local landowners and managers.

[5] Eurostat defines high input intensity farm as the EU farms with the largest purchase of inputs, based on a threshold established at EU level by considering the most intensive farms representing one third of total EU UAA in 2010 (or 2013 for Croatian farms). The input threshold obtained for high input farms is EUR 560 per ha across the European Union. Any farm with a larger input use – covering purchased fertilisers and soil improvers, pesticides, traps and baits, bird scarers, anti-hail shells, frost protection and purchased feed – is designated as high input farm.

[6] High nature value areas are defined as areas where "agriculture is a major (usually the dominant) land use and where that agriculture supports, or is associated with, either a high species and habitat diversity or the presence of species of European conservation concern, or both" (Paracchini et al., 2008[67]). Eurostat reports extent of high nature value environment as its agri-environmental indicator #23.

[7] Agricultural landscape features (or simply landscape features) are defined as small fragments of non-productive natural or semi-natural vegetation in agricultural landscape which provide ecosystem services and support for biodiversity (Czucz et al., 2022[66]).

[8] Information provided by Croatia to the OECD in the context of the annual agricultural policy monitoring.

[9] Poland and Malta.

[10] The EU Recovery and Resilience Facility is the key funding instrument of the Next Generation EU plan to mitigate the social and economic impact of the coronavirus pandemic. It contemplates reforms and investments in several areas, to be implemented by 2026. Croatia's plan consists of 157 investments and 78 reforms, supported by EUR 10 billion in grants and loans. The plan's Component 1.5 aims at increasing food security and the competitiveness of the agri-food sector through eight investments and four reforms.

[11] In the case of organic soils (peatland), the available data is limited, but published estimates suggest that the area of land involved for Croatia would be rather small: 56 594 hectares, i.e. 0.06% of the land in the country (Tanneberger et al., 2017[65]).

[12] The OECD average does not include Chile and Mexico due to data gaps.

[13] According to Croatian authorities, this exceedance is due to the correction of emissions made during the comprehensive technical review of national emissions calculations from 2015, in accordance with the Directive on the reduction of national emissions of certain atmospheric pollutants (2016/2284/EU), and not to an increase in emission sources (number animals or manure management) (Ministry of Agriculture, 2022[3]).

[14] Emission ceilings for NH_3 in Croatia have been set at the following levels through the successive EU regulations: 30 Gt for 2010-2019 (initial level to be reached at the accession date), 46 Gt for 2020-2029 (1% reduction compared to 2005 level) and 35 Gt as from 2030 (25% reduction compared to 2005 level).

[15] The indicator is here focused on pesticide sales and therefore does not provide an accurate indication of pesticide use, the toxicity of the active substances used or their potential environmental harm.

[16] For the rest of the OECD, based on statistics of 2016, which is the last year with data reported for the United States.

[17] Harmonised risk indicators were established to measure progress in meeting the objectives of the European Union Directive 2009/128/EC on the sustainable use of pesticides. HRI 1 is based on pesticide sales data reported to the European Commission by Member States and measures the risk to human health and the environment from pesticides.

[18] Population correction unit is proxy for the size of the food-producing animal population (including all horses and excluding companion animals).

[19] On the basis of the 25 European countries with complete data on the period. Data gaps exist for Greece, Malta and Romania. Note that the United Kingdom is accounted for in this average.

[20] According to government statistics (Ministry of Agriculture, 2019[64]), the share of fisheries in the final energy consumption of this sectoral aggregate was 11% in 2017.

[21] The exact regulatory target is 593 kt CO_2.

[22] Other wooded land in Croatia includes scrubland (maquia, garigue, scrubs and shrub). Forest management in these areas consists mainly of protecting measures to prevent their further degradation and stimulate their succession to forests (FAO, 2020[55]).

[23] A small fraction of this is owned and managed by other public entities.

[24] See https://crobiohub.mps.hr/.

4 Agriculture innovation system

Croatia’s innovation system has evolved significantly over the past two decades. National strategies and initiatives to foster innovation and entrepreneurship were strengthened by accession to the European Union in 2013, which facilitated access to EU funding programmes and partnerships, further contributing to the development and internationalisation of the country's innovation ecosystem in the agro-food sector. This chapter examines the Croatian agricultural innovation system, beginning with an overview of its main characteristics and sector-specific features. It then explores the agricultural knowledge and innovation system (AKIS), focussing on key actors, institutions, governance, and funding sources for innovation. The chapter reviews policies promoting innovation and knowledge transfer, and analyses research and development (R&D) outcomes and selected innovation examples.

Key messages

- Croatia's agricultural innovation performance, while relatively low and subject to important regional disparities, is improving steadily. Structural challenges include: low levels of public and private investments in agricultural research and development (R&D); a fragmented research landscape with weak co-operation among stakeholders; skill gaps and low level of education of farmers; and the limited development of digitalisation.
- The Agricultural Knowledge and Innovation System (AKIS) involves diverse stakeholders but requires more co-ordination. Its members often collaborate in an *ad hoc* manner and a systematic co-ordination effort to strengthen knowledge flows is missing.
- Enhancing research, development and innovation (R&D&I) capacities and encouraging agricultural innovation are among the country's strategic objectives. The government has undertaken important efforts to improve the connection among AKIS actors and the flow of knowledge to farmers, taking advantage of EU funding.
- Croatia has a strong public advisory service that is well-accepted by farmers. Yet this service has capacity constraints. The supply of training and advisory services is gradually becoming more diverse and flexible through the inclusion of private agents and the provision of training for trainers.
- Low levels of uptake of CAP measures that support innovation suggests a limited capacity of the sector to absorb innovation funding. Government efforts to establish a network of innovation brokers and engage with farmers are promising.
- Farmers have low levels of education and inadequate skills, which prevent them from embracing the opportunities provided by innovation. Relevant reforms are underway to reduce the gap between labour market skill needs and the provision of education and training.
- Croatia has narrowed the gap between rural and urban areas in terms of broadband access, but not in access to high-speed Internet. The government is working to improve digital infrastructure and skills in rural areas and to enhance the use of digital data and technology in agriculture.

4.1. General innovation system

Croatia is considered an "emerging innovator"[1] according to the European Innovation Scoreboard. In 2023, it performed at 69.6% of the European Union (EU) average, leading the group of emerging innovators, which averages 54.0% (European Commission, 2023[1]). Croatia's performance is increasing at a higher rate than that of the European Union, narrowing the innovation gap. This score places Croatia 22nd in the EU ranking, above its regional peers Slovakia, Poland, Latvia, Bulgaria, and Romania, and at a similar level to Hungary. In terms of innovation capacities measured by the Global Innovation Index (GII), Croatia ranked 42nd of the 132 economies featured in 2022, and 27th among the 39 European economies (World Intellectual Property Organization, 2022[2]).

Significant disparities remain, however, in the level of innovation of Croatia's regions. The city of Zagreb performs two to four times better than the other regions. According to the Regional Innovation Scoreboard 2023, it is a moderate innovator with a high rate of increase in innovation performance (22.2%), while the other regions are emerging innovators with rates of increase in innovation performance ranging from 5.5% to 12.3% (European Commission, 2023[3]).

4.1.1. Policy approach and framework: National strategies

Encouraging innovation in the agro-food sector has become a strategical objective

Croatia does not have a specific strategy for agro-food innovation. The general framework, called the Smart Specialisation Strategy (S3), is a cross-sectoral strategic plan aimed at encouraging investment in research, development and innovation (R&D&I), mainly with public funds that are often matched with private funds. Following the previous S3 for the period 2016-20, the new *S3 until 2029* was adopted in December 2023, establishing seven thematic priority areas for investment (Government of the Republic of Croatia, n.d.[4]). One of these focus areas is sustainable and circular food, encompassing food production, food processing, and services to food producers. Digitalisation is an important part of this strategy, not only through priority area "digital products and platforms", but through a horizontal guiding principle of "digital transformation" that permeates all priority areas. Strategic actions across the S3 encompass regulatory reforms, grant calls, vouchers, financial instruments and other tools, funded by four sources of funding: the National Recovery and Resilience Plan 2021-2026 (RRP), the Competitiveness and Cohesion Programme 2021-27 from the European Structural and Investment Funds, the European Regional Development Fund (ERDF) and the project "Digital, innovative and green technologies" (DIGIT), a loan agreement between the government of Croatia and the World Bank.

Encouraging innovation in the agro-food sector is one of four goals of the Agricultural Strategy until 2030, which recognises as priorities increased public and private investment in research and development and enhanced technology transfer. Agro-food innovation has also been incorporated into the Croatian Rural Development Programme of the CAP 2014-22. More recently, the strengthening and exchange of knowledge, innovation and digitalisation has been set as a horizontal goal[2] of the 2023-27 CAP Strategic Plan for all EU Member States, including Croatia, mainly in the form of support for knowledge transfer and innovation development. Croatia has identified four needs within this strategic goal, assigning the highest priority to improving the skills of the workforce (Section 2.3.2).

Although the Croatian agro-food sector has made efforts to be innovative, the exchange and dissemination of knowledge and information continue to be fragmented and insufficiently functional. The adoption of new technologies is relatively slow, and the co-operation, co-ordination and information flows between the various stakeholders involved in knowledge generation and transfer remain weak (World Bank, 2019[5]). Additional weaknesses include a lack of public support to research and innovation, a lack of visibility and access to agricultural data and research results, and a lack of diversification of funding for advisory services (i2Connect, 2021[6]).

The successful development of a country's agro-food sector relies on a well-organised and functional Agricultural Knowledge and Innovation System (AKIS). The government has recognised that AKIS needs to function efficiently if it is to be effective. As planned in its 2023-27 CAP Strategic Plan (CSP), the Ministry of Agriculture is in the process of establishing the AKIS Co-ordination Body, composed of key stakeholders, which will monitor and co-ordinate stakeholder activities, strengthen the links and co-operation between researchers, advisors, the CAP National Network and farmers, and exchange experiences and information with the AKIS community of practitioners. Likewise, the ministry is working on the development of digital platforms that will gather and help disseminate information and knowledge, as well as on the strengthening of its advisory services, both in quality and quantity. These efforts are detailed in the following sections.

4.2. Actors, institutions, and governance of the Agricultural Knowledge and Innovation System (AKIS)

4.2.1. Main actors of the AKIS and their role in agricultural innovation

The Croatian AKIS is fragmented, moderately diverse, deeply influenced by state-funded bodies, and places a strong emphasis on public advisory services

The Croatian AKIS[3] is a network of actors that generate, disseminate and apply research, development and innovation (R&D&I). At its centre is the public advisory service, which is part of the Ministry of Agriculture. Scientific-educational and research institutions operating in the agricultural sector are mostly state-owned. The private sector contributes to the agricultural innovation system, mainly in the form of applied research and targeted advisory services. The least developed elements of the AKIS are non-governmental organisations (NGOs) and farmers' organisations (see also Section 5.1.3).

The interactions between the different actors contribute to the generation and dissemination of knowledge both for and from the farmers, who should be at the core of the AKIS. At the centre of agricultural production and management of land and natural resources, farmers take decisions based on the knowledge they generate and receive, and are thus among the principal actors generating and applying innovations to enhance their productivity, sustainability and resilience.

Public institutions contribute to the different stages of the generation and dissemination of innovation and knowledge. Ministries define strategies and national objectives, plan expenditures and activities, and co-finance initiatives. Within the Ministry of Agriculture, the Directorate for Professional Support to the Development of Agriculture (DPSDA) is the main provider of agricultural advisory services. Public institutions include research institutes (Osijek Agricultural Institute, Institute for Agriculture and Tourism in Poreč, and Institute for Adriatic Crops and Karst Reclamation in Split), and agencies related to food safety (Croatian Agency for Agriculture and Food), agricultural meteorology (Croatian Hydrometeorological Institute), veterinary and phytosanitary issues (Croatian Veterinary Institute), and natural resource management. The Ministry of Science and Education provides competitive R&D funding across all sectors and topics.

A wide range of scientific and academic institutions are important players in generating knowledge that can lead to innovation for agro-food productivity and sustainability. The education and training sector is made up of universities and colleges, agricultural and veterinary secondary schools, and regional centres of competences for vocational education.

Relevant associations contribute to enhancing knowledge flows. Farmer associations, in particular the Croatian Chamber of Agriculture, co-operate with educational, scientific, professional and research institutions to develop agricultural production and markets. Professional associations, such as the Croatian Chamber of Agronomists and the Croatian Society of Food Technologists, Biotechnologists and Nutritionists, are active in promoting events at which advisors and consultants build knowledge and skills.

The Croatian CAP Network helps foster innovation in agriculture and rural development and supports peer-to-peer learning, as well as the inclusion and interaction of all stakeholders in the process of building and exchanging knowledge. For historical reasons, there are few co-operatives in Croatia.

The private sector is made up of numerous heterogenous actors such as farmers, agricultural advisors, traders in agricultural products, food processors and input suppliers, among others. They can perform their own R&D&I activities, encourage the training of their workers, and provide farmers with know-how and technical assistance.

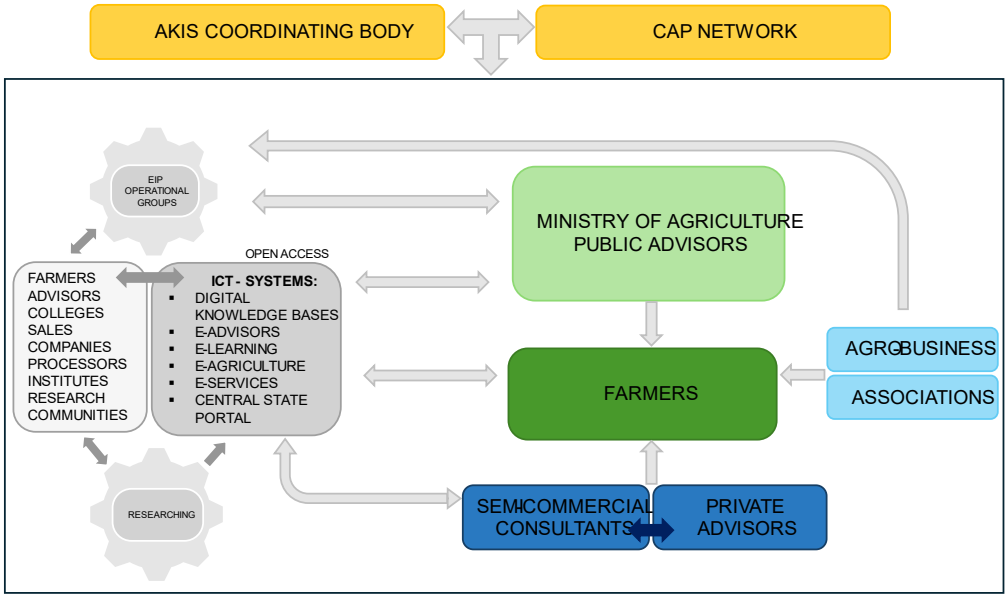
The Croatian AKIS is currently fragmented[4] and needs more co-ordination. Individual co-operation between AKIS stakeholders occurs in an *ad hoc* manner in implementing national and international projects, but co-ordinated co-operation efforts focused on farmers' needs are so far absent. To set up a functional AKIS, scientific research must be conducted and applied, innovations introduced, digital solutions developed, advisory services available and effective, partnerships and operational groups[5] established and functional, and, above all, farmers must be involved in the advisory, training and knowledge exchange systems and in the work of innovative operational groups (World Bank, 2019[5]) (European Commission, 2020[7]) (i2Connect, 2021[6]) (Ministry of Agriculture, 2022[8]).

Aware of the gaps that affect the efficiency of the system, the Croatian Government is leading the process of strengthening its AKIS through multiple actions developed by the Ministry of Agriculture. Areas of work include strengthening links with scientific institutions, enhancing advisors' expertise and co-operation, supporting partnerships for innovation, and promoting the effective use of ICTs.

Figure 4.1 shows a representation of the AKIS that the government aims to implement. At the heart of this reinforcement process, the AKIS co-ordinating body – established in early 2024 and comprised of 24 representatives from a broad spectrum of AKIS stakeholders – should strengthen the connection and integration amongst actors and ensure more efficient information and knowledge flows.

Figure 4.1. Croatia is working to strengthen the AKIS and improve knowledge flows

The future AKIS as envisioned by the Ministry of Agriculture



Note: Authors' adaptation of the AKIS diagram included in the Strategic Plan for the Common Agricultural Policy of the Republic of Croatia 2023 – 2027 (English translation provided by the Croatian Ministry of Agriculture). Although not represented here, the Ministry of Science and Education plays an important role in the AKIS system and should be added to an updated version of the diagram.
Source: Ministry of Agriculture (2022), *Strategic Plan of the Common Agricultural Policy of the Republic of Croatia 2023 - 2027 (automatic translation)*, https://ruralnirazvoj.hr/files/Strateski-plan-Zajednicke-poljoprivredne-politike-Republike-Hrvatske-2023.-2027..pdf.

4.2.2. Funding, funding bodies, and main authorities within the AKIS

Croatia has a centralised national governance system operating within the EU framework

The central government is responsible for the overall promotion and co-ordination of scientific and technical research. The Ministry of Agriculture and the Ministry of Science and Education (MZO) lead in defining general strategic research priorities and implementing most R&D&I policies for the agro-food sector. They delegate some of these tasks to implementing agencies, which co-ordinate the various programmes and allocate the corresponding funds. Public funding is provided by the European Union and the national government. The main users of the funds are the private sector (industry), research centres, and educational institutions.

Figure 4.2 provides an overview of the Croatian AKIS funding ecosystem, depicting the main authorities and implementing agencies, the most important funds, funding streams, and relevant performing public and private actors.

European Union funding

The European Union contributes to the Croatian AKIS through different programmes. Some are directly linked to agriculture and to agricultural R&D&I, but most are not sector-specific. The main EU innovation programmes are Horizon 2020 (2014-20) and its successor Horizon Europe (2021-27).

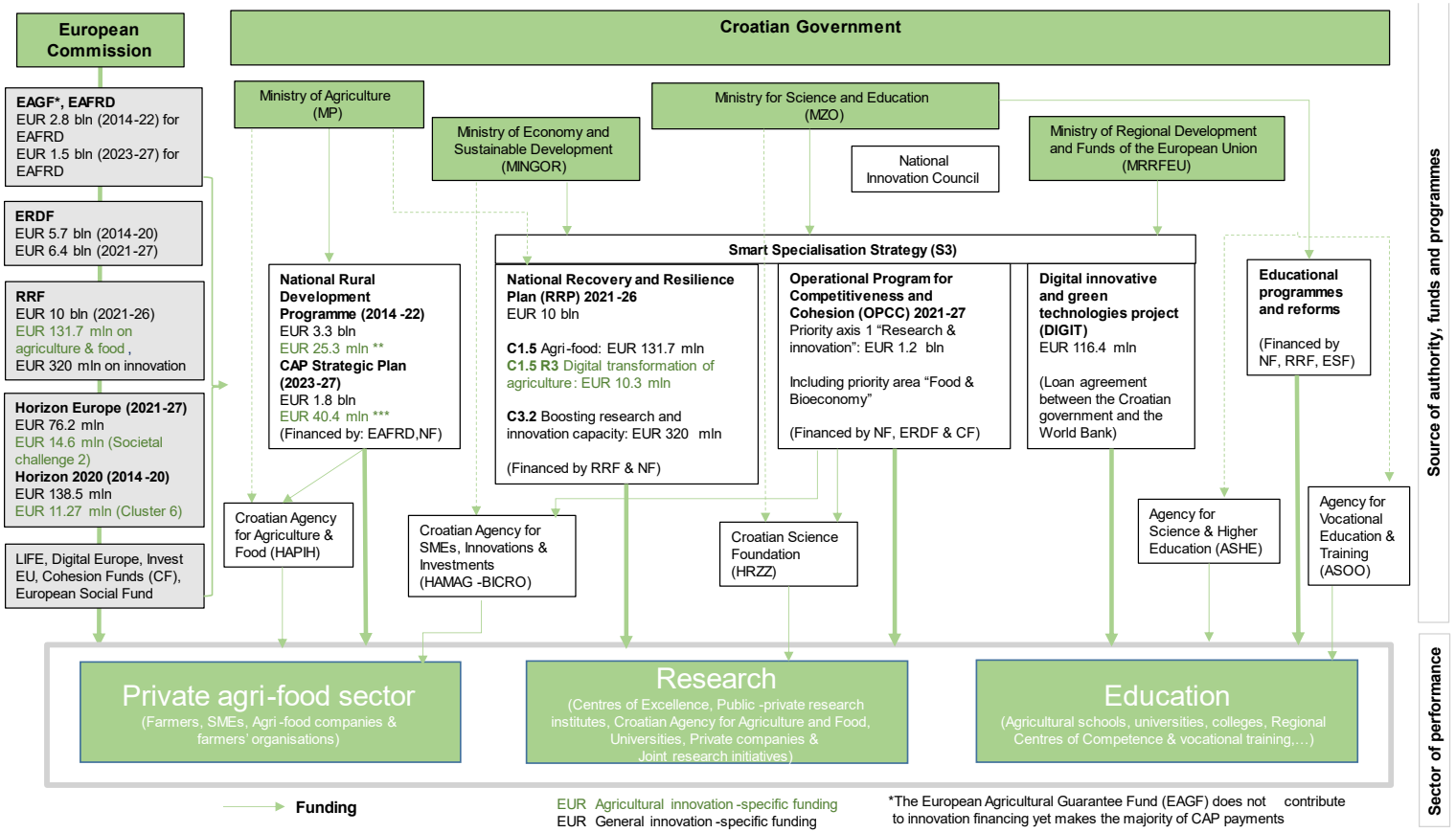
During the operation of Horizon 2020, Croatian entities received EUR 138.5 million, or 0.20% of the programme's total funding. Forty-four Croatian organisations received grants for EUR 11.3 million under Societal Challenge 2 "Food security, sustainable agriculture and forestry, marine and maritime and inland water research and the bioeconomy", which covers the agro-food sector (European Commission, 2023[9]). More than half of the funding of public-public partnership projects in which Croatia participated was dedicated to this thematic priority (European Commission, 2022[10]).

In the new Framework Programme for Research and Innovation 2021-27 (Horizon Europe), most funding for the agro-food sector is provided under Cluster 6 "Food, Bioeconomy, Natural Resources, Agriculture and Environment''. This cluster is designed to foster knowledge, build capacity and develop novel solutions to promote sustainable land use and a more sustainable, resilient and inclusive agricultural sector. To date, Croatia has received an overall Horizon Europe EU contribution of EUR 76.2 million, of which EUR 14.6 million have been earmarked for 60 initiatives under the agro-food-related Cluster 6.

The Common Agricultural Policy (CAP) of the European Union is another key tool for funding agro-food R&D&I activities. The CAP's Pillar 2 fund that finances each Member State's Rural Development Programme (RDP) – through the European Agricultural Fund for Rural Development (EAFRD) and national co-financing– is partly devoted to R&D&I activities. Three specific measures include knowledge transfer, advice and innovation through co-operation. This co-operation builds on the European Innovation Partnership for Agricultural Productivity and Sustainability (EIP-AGRI), in particular the EIP-AGRI Operational Groups (see Section 4.3.2). The three R&D&I measures under the Croatian RDP for 2014-22 (Measures 1, 2 and 16) represent a budget of EUR 25.3 million, while the same instruments under the 2023-27 CSP (Interventions 78.01, 78.02 and 77.03) have a planned budget of EUR 40.4 million (see Section 4.3.1).

The European Regional Development Fund (ERDF) contributes to financing the Croatian Smart Specialisation Strategy (S3), which identifies research and innovation priorities in strategic sectors, including the agro-food sector (Section 4.1.1). The Cohesion Funds and other European programmes, such as LIFE, Digital Europe, have also been a source of funding for Croatian AKIS entities.

Figure 4.2. Funding of the Croatian System of Agricultural Research and Innovation



Note: This is a stylised and not a fully comprehensive diagram that aims to illustrate the flows of funds and institutional arrangements. The figures on funding might correspond to different periods and are thus indicative only. They aim to provide an idea of the magnitude of the different funds. Bolded arrows indicate funding for the three sectors of performance, i.e. the private sector, research and education. NF means National Funds. Except for EAFRD, the amounts of EU funds displayed on the left side of the diagram (in grey cells) also include the corresponding national contribution.
** Total updated planned budget for measures related to knowledge transfer (M1), advisory services (M2) and co-operation (M16) in Croatia's RDP under the CAP 2014-20, as of 2023.
*** Total planned budget for interventions related to knowledge transfer (78.01), advisory services (78.02) and support for EIP-Agri Operational Groups (77.03) in Croatia's CSP 2023-27, when approved.
Source: Authors, based on official sources and informal information from meetings and exchanges.

The Recovery and Resilience Facility (RRF) is the European Union's recovery instrument in response to the COVID-19 crisis (see also Section 2.4.1). Three of its six pillars (green transition, digital transformation, and social and territorial cohesion) encompass relevant measures that help foster a sustainable agricultural sector. More concretely, one component of the Croatian Recovery and Resilience Plan 2021-26 (C1.5) is dedicated to the agro-food sector and supports the digital transformation of agriculture. Other components support reforms and investments in the development of digital skills more broadly (C1.1), in boosting research and innovation capacity (C3.2), and in modernising the higher education system (C3.1), all relevant improvements for the development of the Croatian AKIS.

National bodies, funding and programmes

Since its accession to the European Union in July 2013, Croatia has undertaken a series of reforms of its innovation system to improve the country's research and innovation performance (Račić and Švarc, 2020[11]).

The Ministry of Science and Education (MZO) is primarily responsible for research, development and innovation policies across all sectors and was traditionally the main funding body for R&D&I. Following EU accession and Croatia's access to EU funds, other ministries, including the Ministry of Economy and Sustainable Development and the Ministry of Regional Development and EU Funds now have a more prominent role in this area. Together, these three ministries implement the Smart Specialisation Strategy (S3), as well as operational programmes related to Priority Axis 1 of the Operational Programmes for Competitiveness and Cohesion (2014-2020 and 2021-27). The main sources of funding are national, in addition to the Recovery and Resilience Facility (RRF) and the European Regional Development Fund (ERDF).

The Ministry of Science and Education collaborated with the Ministry of Agriculture in the preparation of the CAP Strategic Plan, jointly designing some of the interventions. It is also in charge of Horizon programmes.

The National Innovation Council, created in 2018, is an umbrella body at the government level. It has five thematic innovation councils (TICs) – including the TIC on Food and Bioeconomy –, which act as the main co-ordinating bodies and provide an opportunity for networking among the representatives of the business (70%), research (20%) and public (10%) sectors who conform them (Innovation Platform, n.d.[12]).

The Croatian Science Foundation (HRZZ) – attached to the MZO –is the single national funding body for competitive projects in basic research. Between 2013 and 2022, it financed 107 projects in the fields of Agriculture, Forestry and Food technology, with a total of EUR 15 million for the entire period (Croatian Science Foundation, n.d.[13]). The Croatian Agency for Small Business, Innovation and Investments (HAMAG-BICRO) – attached to the Ministry of Economy and Sustainable Development – is responsible for the implementation of EU-funded measures related to R&I of businesses, provides guarantees to small and medium enterprises (SMEs), and implements other innovation programmes, including Proof of Concept.

The Ministry of Agriculture is responsible for designing and implementing the innovation-related measures included in the CAP. Within this Ministry, the Directorate for Professional Support to the Development of Agriculture is in charge of training, advice and knowledge transfer systems in the agro-food sector. To this end, it co-ordinates the national AKIS and participates in various multi-actor projects under Horizon related with the European AKIS (such as FairShare and i2connect under Horizon 2020, and ModernAKIS under Horizon Europe).

In the area of education, the Ministry of Science and Education (MZO) defines and co-ordinates policies that are important for the innovation capacities of the agro-food sector, including higher education and vocational training. The public and independent Agency for Science and Higher Education (ASHE) encourages the development of quality assurance in higher education and science, aiming to improve the

quality of higher education institutions and scientific organisations. The Agency for Vocational Education and Training (ASOO) works in planning, implementation, monitoring and improvement of the vocational and adult education system, advocating its co-operation with the industry. The Agency for Mobility and EU Programmes (AMEUP) is responsible for the implementation of various educational initiatives in Croatia, including the Erasmus+ programme.

4.2.3. Public national and regional R&D&I organisations

Strong and experienced R&D&I organisations…

Attached to the Ministry of Agriculture, the Croatian Agency for Agriculture and Food (HAPIH) conducts development and research activities, finding innovative solutions, and disseminating knowledge. It leads and collaborates on research projects in co-operation with other AKIS stakeholders[6] and manages several EIP-AGRI operational groups implemented under Measure 16 of the 2014-22 RDP. HAPIH possesses scientific capacities, including laboratories and researchers, and is in the process of accreditation to become a scientific institution, which will allow it to build up its scientific capacity and participate in calls for funding.

Croatia has a long tradition of agricultural science and education. It hosts the oldest agricultural and forestry college in Southeast Europe, the Royal College of Economics and Forestry at Križevci University of Economics, established in 1860. Today, this university is renowned for its practical teaching methods and facilities, including opportunities for applied research and practical experience in cattle breeding and plant production (World Bank, 2019[5]). The first Croatian agricultural scientific institute, the Seed Research Station, was founded in 1893 (Ministry of Agriculture, 2022[8]).

Several other universities and colleges engage in agro-food-related R&D&I activities. The Faculty of Agriculture of the University of Zagreb, established in 1919, leads higher education in biotechnical sciences, with 2 500 students and 240 faculty members conducting research in 13 fields covering over 37 research infrastructures. It focuses on agricultural production, livestock breeding, and viticulture, and participates in EU-funded applied research and innovation projects.[7] The Veterinary Faculty of the University of Zagreb, a longstanding institution in Croatia's veterinary profession, offers academic studies, scientific research, and lifelong education programmes. The Faculty of Agrobiotechnical Sciences at Josip Juraj Strossmayer University specialises in biotechnical sciences, particularly soil and crop research (World Bank, 2019[5]).

Three major public research institutes, strategically situated across Croatia, conduct R&D&I activities tailored to the distinctive agricultural production of their respective regions: the Institute for Agriculture and Tourism in Poreč, focuses on wine and olive oil production in Istria; the Agricultural Institute in Osijek, specialises in plant production and genetic improvement of cereals and fruits; and the Institute for Adriatic Crops and Karst Reclamation in Split, addresses the challenges of biotechnical sciences in Dalmatian agriculture, especially with regard to grapevines and olive varieties. The three institutes participate in national and international research projects.

… in a fragmented and insufficiently co-ordinated landscape

The Croatian research landscape comprises 15 000 researchers across 25 public research institutes, with three focused on the agro-food sector, alongside universities and independent faculties. The research system is fragmented, and developing human capital is a challenge. Efforts are underway through legal reforms carried out under component C3.2 of the RRP to strengthen research and innovation capacity across all sectors. The *Act on Higher Education and Scientific Activity* (effective October 2022) and the *Regulation on Programme Funding for Public Higher Education Institutions and Public Scientific Institutes* (effective July 2023) aim to refine institutional funding, fostering strategic priorities, collaboration, and performance-based funding. Through anticipated programme agreements between the government and

publicly funded educational and scientific institutions, funding will be linked to performance, allowing for enhanced research quality and relevance.

Applied research in agriculture is conducted across multiple institutions, yet there is at present no established mechanism for translating this knowledge into practical guidance for farmers and other stakeholders. The Agricultural Research Council (*Vijeće za istraživanja u poljoprivredi* - VIP) operated from the late 1990s until 2018, initially funded by a World Bank loan and later sustained by national funds, with the aim of bridging the gap between knowledge generation and transfer. While the Council managed funds for applied research and disseminated findings through various means, including brochures and workshops, plans to develop a system for transferring research results in the form of technical packages directly to agricultural advisors were never realised (World Bank, 2019[5]) (i2Connect, 2021[6]).

Co-operation between universities, research institutes and public advisory services has not yet started or there is no information on whether their research findings have been shared with other stakeholders or have been disseminated in a systematic way. There is also little information about networking activities organised at the national level or the existence of tools such as knowledge platforms to connect research actors with farmers, advisors, and rural businesses, and facilitate the implementation of up-to-date research findings and innovations (European Commission, 2020[7]). The Ministry of Agriculture is working to strengthen this co-operation and establish such platforms (Section 4.3.3).

4.2.4. Farm advisory services

Well-established public farm advisory services are well accepted by farmers, but since 2013 focus on CAP procedures

The history of structured advisory activities in Croatia spans over 80 years. Following the country's independence, the government established the public agricultural advisory service in 1991. The service has experienced changes in its purpose, autonomy levels, and funding sources over the years (Box 4.1).

Since 2019, the public advisory service is part of the Directorate for Professional Support to the Development of Agriculture within the Ministry of Agriculture. It is responsible for planning, managing and implementing advisory activities, and for providing expert advice on new technologies, innovations, knowledge and skills needed to develop and preserve the value of rural areas and the sustainable development of agriculture. It operates with 230 advisors spread across 117 offices grouped in 20 regional services. Regional offices include advisors from different specialisations – agriculture, horticulture, animal husbandry, plant protection, agroeconomics, etc. –according to each region's agricultural profile. Public advisory services are free of charge (Ministry of Agriculture, 2022[8]).

Professional training and exchange of knowledge and information are provided through courses, workshops, webinars and demonstration activities. Courses are organised with an average of 20 participants. Demonstration activities, where new technological advances, examples of good agricultural practices and animal welfare, are organised in co-operation with other stakeholders. The beneficiaries are generally agricultural producers who must follow professional training on agri-environment and climate change, organic production and animal welfare to benefit from CAP payments. Emphasis is placed on professional training for young farmers.

The public advisory service is considered an asset of the Croatian AKIS, well developed and experienced, and well accepted by farmers. The service covers all areas of agriculture, primarily economic, technical and technological aspects of agricultural production, as well as topics related to diversification, current tax regulations, and the interpretation of EU regulations. Since EU accession − and particularly since the establishment of the new CAP 2023-27 − the service faces additional demands associated with the requirements and rules of the EU and the CAP policy instruments. Advisors spend most of their time

explaining to farmers how to apply for subsidies and how to implement the multitude of measures available, and administrative tasks take up an important share of the service's capacity.

A recent assessment by the European Commission considers there are too few advisors – on average one for 585 farms –, which raises doubts about the capacity to provide effective services and cope with the increased responsibilities linked to the new CAP and to environmental and climate challenges, while at the same time increasing the sector's competitiveness and productivity (European Commission, 2020[7]).

Box 4.1. Evolution of the Croatian agricultural advisory system

In the decades before Croatia's independence, specialised agricultural knowledge remained largely within Yugoslavia's large socialised agro-industrial enterprises (*agro-kombinats)*, with limited impact on family farms. The establishment of a state-funded public advisory service in 1991 was one of the first agricultural policy measures implemented in independent Croatia. From 1991 to 1997, an independent public institution, the Croatian Centre for Agriculture, introduced a two-tier state-funded advisory service, with an emphasis on regional co-ordination and local expertise.

In 1997 the Croatian Agriculture Extension Institute (CAEI) was created as a specialised institution with a higher degree of independence. CAEI further developed the agricultural knowledge system with funding from the World Bank, establishing the Agriculture Research Council (VIP). This body managed funds for applied research aimed at directly addressing farmers' challenges and started efforts to put in place a structured knowledge transfer system. The Council's pivotal role declined over time due to lack of funding and reduced farmer engagement, as the provision of specialised advice by the Advisory Service became increasingly occupied with administrative tasks.

In 2010 the Advisory Service was transferred to the newly established Croatian Chamber of Agriculture, but in 2012 it was reinstated as an independent entity, the Advisory Service Croatia (ASC). This phase, which coincides with entry into the European Union, was one of the most active of the Croatian advisory service. It joined international advisory associations, securing funding from rural development programme measures (M1 and M2) and project initiatives (Horizon) to enhance financial stability and service quality for farmers, aligning with the ongoing AKIS development at the EU level. In 2018, ASC was abolished and absorbed by the Ministry of Agriculture, while applied research projects overseen by VIP were replaced by European Innovation Partnership (EIP) projects.

Since 2019, the Directorate for Professional Support to the Development of Agriculture at the Ministry of Agriculture is responsible for managing agricultural advisory activities, with the mission of providing expert guidance on new technologies, innovations, and skills necessary for the sustainable development of rural areas and agriculture.

Source: i2Connect (2021[6]), Žimberk, Grgić, and Franić (1993[14]).

The government is making efforts to improve the quantity and quality of services

Recognising the need to strengthen advisory services, the Ministry of Agriculture is in the process of establishing an advisory back office, staffed by advisors with specific areas of expertise who provide expert support to AKIS stakeholders and train other advisors. Drawing on existing expert working groups within the Ministry, this back office is expected to apply a bottom-up approach, collecting farmers' needs in the field through a "one-stop shop for innovation" and engaging advisors (or innovation brokers) in searching for solutions on the ground.

The government is also striving to improve the supply of advisory services, both in quality and quantity. A call for tender published in July 2023 aims to create a network of certified private advisors who will have to pass a test by the Chamber of Agriculture. The idea is to create a public website where farmers can

search for and select advisors. The private advisors hired would take over administrative tasks that currently overwhelm the public service. EU public funds to support training activities and advisory services for farmers – called M1 and M2 under CAP 2014-22 and 78.1 and 78.2 under CAP 2023-27 – have recently been opened to private advisors. This development allows for an increase in the range of advisors and for greater competition.

The Directorate for Professional Support to the Development of Agriculture participates in relevant EU initiatives[8] that have contributed to building knowledge within the team of advisors, developing connections amongst participants, and sharing experiences.

Other public and private organisations provide advisory, educational, and information services. They include professional and scientific institutions, research institutes, educational establishments, private consultants, independent experts, civil society and professional organisations, different chambers and associations, as well as input suppliers and food processors, which are part of a broader advisory system. Sectoral events organised by professional associations are also important in terms of knowledge transfer and innovation.

4.2.5. The role of the private sector in knowledge generation and transfer

Private actors play a role in generating and transferring knowledge, but their capacities are not always fully exploited

Although there are numerous public and private entities with extensive experience in educational, research and consulting activities, their co-operation is very limited or non-existent, as the Croatian AKIS is concentrated in the public sector (World Bank, 2019[5]).

As noted above, several private actors are involved in the provision of agricultural advisory services. Among the most relevant, the Chamber of Agriculture – the main umbrella organization for associations, co-operatives, family farms and businesses – plays an important role. The Chamber hosted the newly privatised agricultural advisory service in 2010-12 (Box 4.1), with a model similar to that of Austria and France, where advisory services are provided by the Chambers of Agriculture. Today, the Chamber still co-operates with educational, scientific, professional and research institutions in Croatia and abroad. It participates in innovation projects and EU partnerships, and carries out vocational training, seminars, courses and workshops. The Chamber is also developing an online platform to better reach farmers.

Experts from food processing companies and input suppliers constitute an active and effective part of the Croatian AKIS. Larger processors traditionally co-operate throughout their production process with farmers - usually contract growers, primarily family farms and small businesses. Most dairy companies (e.g. Dukat and Vindija) buy their milk from local farmers and arrange for milk collection. Despite significant imports, meat processors, such as Belje, also purchase raw materials from local farmer suppliers, as do processors of fruits and vegetables (e.g. PIK Vinkovci, Podravka, PP Orahovica), grapes (e.g. Agrolaguna) and arable crops (eg. Zito). In most cases, these processing companies support farmers by providing teams of experts who give them advice on production (World Bank, 2019[5]).

Several domestic and foreign companies involved in the supply of animal feed, seeds, plant protection products, machinery and equipment also have experts who provide advisory services to farmers on the area of expertise of the company concerned. As is the case for food processors, the advisory services of these companies are often high-level and focused on improving production and productivity, while offering the latest technologies and innovations directly from the best research institutions in the world (World Bank, 2019[5]).

Other private consultants mainly carry out tasks related to project development and preparation of tender documents to help farmers benefit from CAP subsidies.

Private institutes and companies are also involved in the R&D&I landscape. Among the most relevant, the Bc Institute for breeding and seed production of field crops Zagreb – Bc Institut Zagreb[9] – develops, produces and sells its own hybrids and new varieties of seeds to local and foreign markets, and is today the largest institution in the field of farm crop breeding in Croatia (Bc Institut Zagreb, 2023[15]). In the process of developing new varieties, the institute interacts with farmers to gather their needs and improve their production. The Bc institute also co-operates with universities, participates in funded research projects, and is part of working groups organised by the Ministry of Agriculture.

Many food processors and input suppliers are involved in trials and research projects in Croatia, primarily addressing their production or marketing needs. However, there is no systematised data on their activities (World Bank, 2019[5]).

The government is working to increase the private sector's involvement

Croatia has developed several policies aimed at promoting private R&D&I activities, but none are specific to the agro-food sector.

The government is taking the first steps to strengthen co-operation with the private agro-food sector. One action carried out by the Ministry of Agriculture seeks to improve the visibility of public and private advisors on the public web platform presently under construction. This website will contain information on the advisors' experience, knowledge, education and relevant business activities, which should help farmers select advisors that meet their needs. It is also expected to help AKIS stakeholders, including private actors, to find partners and join EIP operational groups and Horizon Europe multi-actor projects.

The private sector is increasingly involved in decision-making regarding R&D&I. The AKIS Co-ordination Body will include representatives from all stakeholder groups, including farmers and agro-food companies, and is called to become a hub linking the private and public sectors with farmers.

Representatives of the Croatian Chamber of Agriculture and the Croatian Chamber of Economy participate in all committees and working groups that create strategic documents or design measures and financing options offered by the Ministry of Agriculture. Where necessary, other associations are included, such as the Croatian Employers' Association.

4.3. Policies facilitating innovation and knowledge transfer

4.3.1. Public and private investments in R&D&I

Overall R&D is mostly financed and performed by the business sector, while agricultural R&D is driven by governmental expenditures

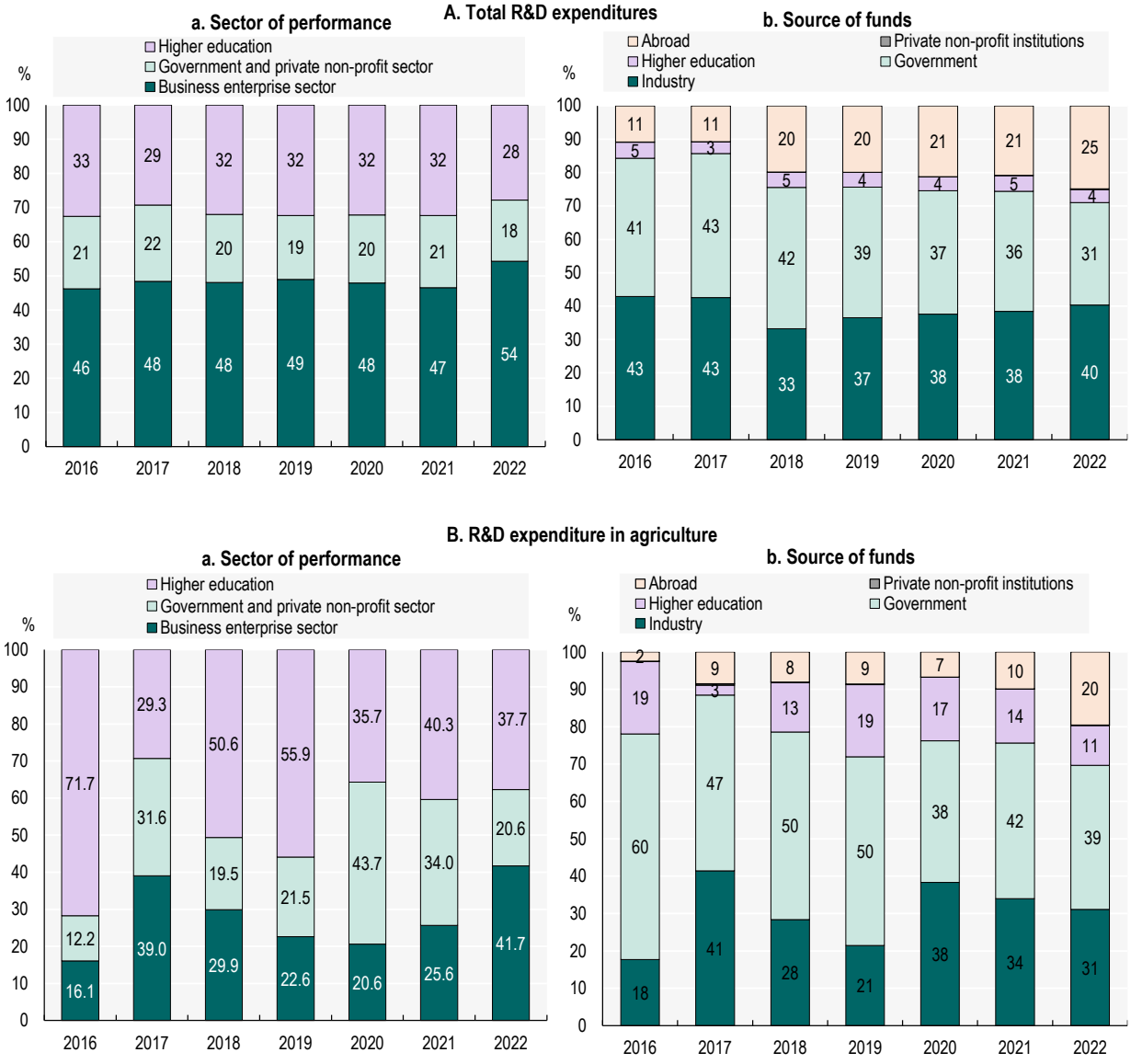
Considering the Croatian economy as a whole, the business sector is the main actor undertaking R&D activities. In 2022, it performed 54% of the R&D activities, followed by the higher education sector (28%) and the government (18%) (Figure 4.3, Panel A). It is a significant source of funding for R&D, accounting for 40% of the funds in 2022, followed by the government (31%). Funding from abroad represented a quarter of total funds in 2022, and is taking an increasingly significant role in R&D.

Figure 4.3 Panel B shows the specific situation of agro-food R&D expenditures. In this case, the source of funds and sector of performance is seen to be quite irregular, with no clear trends over time. The government has remained the main source of funds in recent years, accounting for 38% to 60% of the funds spent between 2016 and 2022, followed by the private sector (18% to 41%). Funding from abroad is increasing in agricultural R&D, and in 2022 represented a fifth of the funds. No specific sector clearly leads the performance of agricultural R&D activities. While the higher education sector had the highest

share of agricultural R&D initiatives in 2016, 2018, 2019 and 2021, the government led in 2020 and the private sector in 2017 and 2022.

Figure 4.3. The government is the main source of agricultural R&D

Gross domestic expenditure on total and agricultural R&D in Croatia



Note: Agriculture includes agriculture (agronomy), forestry, wood technology, and veterinary medicine as defined in the 'Rulebook on scientific and artistic fields, fields and branches published in Official Gazette No. 118 of 2009'.
Source: Croatian Bureau of Statistics (2023).

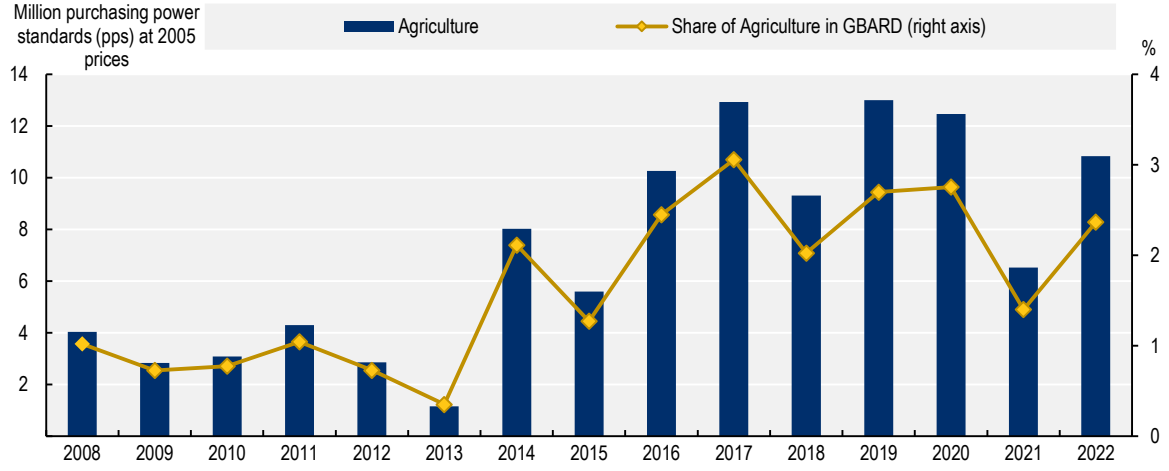
Government funds for agricultural R&D significantly increased following EU accession, but remain low compared to other sectors

Total R&D investment in Croatia is among the lowest in Europe, although higher than in several peer countries such as in Bulgaria, Romania and Slovenia, and at a similar level to Slovakia. The Croatian government has significantly increased its support to agricultural R&D activities since 2014, coinciding with

EU accession (Figure 4.4). However, the agro-food sector receives a relatively low share of support compared to other economic sectors: in 2022, it represented only 2.4% of the entire R&D budget, slightly below the EU average (3.0%).

Figure 4.4. Government funds for agricultural R&D significantly increased after EU accession

Government budget allocation for R&D in Croatian agriculture (in value and as a share of total GBARD)



Note: Government budget allocation for research and development (GBARD) is a funder-based approach for reporting R&D, which involves identifying all the budget items that may support R&D activities and measuring or estimating their R&D content. It allows linking these budget lines to policy considerations through classification by socioeconomic objective. However, it only provides a partial picture of investment in public agricultural research, since it refers to research funding instruments dedicated specifically to agriculture.
Source: Eurostat (2023). GBARD by socioeconomic objectives (NABS 2007) [GBA_NABSFIN07]. Consulted November 2023.

Agricultural R&D expenditure intensities show a mixed picture, with private expenditure low and declining

Croatia's overall gross domestic expenditure on R&D (GERD, which covers public and private R&D expenditures by all residents in a country) more than doubled in nominal terms during the last decade. In 2021, it reached 1.24% of GDP, compared to 0.88% in 2011, below the averages of 2.16% for the European Union and 2.72% for OECD countries. Croatia's level of investment is comparable with those of Italy, Lithuania and Hungary, but higher than in Romania and Bulgaria (Table 4.1).

Agriculture shows a similar growth trend: the intensity of agricultural R&D from all sources in Croatia is relatively high and has increased over time. In 2021, the public gross domestic expenditure on R&D (public GERD) in agricultural innovation represented 2.05% of the sector's value added, the second highest among peer countries for which data was available.

An examination of the government budget allocation for R&D (GBARD) as a percentage of GDP shows that the 2022 rate in Croatia (0.65%) is close to the EU average (0.74%), and higher than in most peer countries. However, the specific allocation for agricultural R&D (GBARD) as a percentage of the sector's value added (0.50% in 2022) is well below that of most EU peers and the EU median, even if it has significantly increased over time (from 0.17% in 2008).

Investment for private R&D (BERD) as a percentage of GDP increased from 0.39% in 2008 to 0.58% in 2021. However, private investment in agricultural R&D is extremely low. Available data show that in 2021, it accounted for just 0.02% of the sector's value added, among the lowest levels of EU Member States and other OECD Member countries. In contrast, private investment in R&D in the food and beverages sector reached 0.34% of the sector's value added in 2021, which positions Croatia above the EU median of 0.18%, even if this indicator has decreased by more than half since 2008.

Table 4.1. Government R&D expenditure intensities for agriculture have grown over time, while private expenditures are decreasing

R&D expenditure intensities

Indicator	GERD[1] total as a % of GDP		Public GERD on Ag. science[2] as a % of sector's value added		GBARD[3] total as a % of GDP		GBARD on Agriculture[4] as a % of sector's value added		BERD[5] total as a % of GDP		Agriculture BERD[6] as a % of sector's value added		Food and beverage BERD[7] as a % of sector's value added	
Field of R&D	All		Agriculture		All		Agriculture		All sectors		Agriculture		Food and beverages	
Sector of performance	All sectors		Public (Government and Higher education)		All sectors		All sectors		Business		Business		Business	
Source of funds	All sources		All sources		Government		Government		All sources		All sources		All sources	
	2008	2021	2008	2021	2008	2022	2008	2022	2008	2021	2010	2021	2008	2021
Croatia	**0.88**	**1.24**	**1.51**	**2.05**	**0.65**	**0.65**	**0.17**	**0.50**	**0.39**	**0.58**	**0.002**	**0.02**	**0.72**	**0.34**
Romania	0.55	0.47	0.32	0.41	0.38	0.12	0.54	0.08	0.17	0.29	0.49	0.03	0.02	0.02
Slovenia	1.63	2.13	1.05	1.69	0.50	0.55	1.11	1.56	1.05	1.56	0.04	0.16	0.30	1.14
Hungary	0.98	1.64	1.51	0.63	0.42	0.36	1.13	0.64	0.51	1.24	0.44	0.30		0.83
Lithuania	0.79	1.11	1.49	1.34	0.47	0.33	0.80	0.26	0.19	0.55	0.04	0.11	0.10	0.47
Bulgaria	0.45	0.77	0.84	...	0.29	0.22	1.14	1.09	0.14	0.51	0.02	0.00	0.02	0.28
Italy	1.16	1.45	1.64	1.94	0.61	0.65	1.44	0.83	0.62	0.88	0.01	0.07		0.94
Austria	2.57	3.26		2.95	0.68	0.87	1.02	1.13	1.78	2.24		0.14		1.02
Israel	4.26	5.56							3.53	5.06	...	...	...	...
EU27	1.78	2.16	...	...	0.70	0.74	1.58	...	1.11	1.41	0.29	0.32	0.77	0.88
EU27(median)	1.25	1.46	1.48	1.75	0.50	0.56	1.13	0.84	0.71	0.90	0.04	0.07	0.02	0.18
OECD	2.28	2.72	...	...	...	...	...	...	1.57	1.99	...		...	

Notes: 2007 and 2008, 2020 and 2021, or the nearest available year.

1. Gross domestic expenditure on R&D (GERD) is defined as the total expenditure (current and capital) on R&D carried out by all resident companies, research institutes, university and government laboratories, etc., in a country. It includes R&D funded from abroad but excludes domestic funds for R&D performed outside the domestic economy.
2. Gross domestic expenditure on R&D (GERD) for agricultural and veterinary.
3. Government budget allocation for R&D (GBARD) is a funder-based approach for reporting R&D, which involves identifying all the budget items that may support R&D activities and measuring or estimating their R&D content. It enables linking these budget lines to policy considerations through classification by socioeconomic objectives.
4. Government budget allocation for R&D (GBARD) on Agriculture covers all R&D aimed at the promotion of agriculture, forestry, fisheries and foodstuff production, or furthering knowledge on chemical fertilisers, biocides, biological pest control and the mechanisation of agriculture, as well as concerning the impact of agricultural and forestry activities on the environment. This also covers R&D aimed at improving food productivity and technology. It does not include R&D on the reduction of pollution; on the development of rural areas; on the construction and planning of buildings; on the improvement of rural rest and recreation amenities and agricultural water supply; or on energy measures.
5. Business Expenditure on R&D (BERD) is the measure of intramural R&D expenditures within the business enterprise sector (regardless the sources of R&D funds).
6. Business Expenditure on R&D (BERD) on Agriculture, forestry and fishing.
7. Business Expenditure on R&D (BERD) on Manufacture of food products, beverages and tobacco products.
8. The European Union (27 countries) aggregate was estimated for the BERD, sectors Agriculture, and Food and beverage.

Source: Authors' calculation based on OECD (2023), Research and Development Statistics (database), [Gross domestic expenditure on R&D by sector of performance and field of R&D (FORD); Government budget allocations for R&D; Business enterprise R-D expenditure by industry (ISIC 4)]; STI Main Science and Technology Indicators (database), [BERD as a percentage of GDP]; and National Accounts (database), [Gross domestic product (GDP) - Gross value added at basic prices by activity, ISIC rev4; Value added and its components by activity, ISIC rev4], https://stats.oecd.org/ (accessed August 2022); Eurostat (2023), BERD by NACE Rev. 2 activity (database), [RD_E_BERDINDR2], GBARD by socioeconomic objectives (NABS 2007) (database), [GBA_NABSFIN07], GDP and main components (database) [NAMA_10_GDP], National accounts aggregates by industry (up to NACE A*64) (database) [NAMA_10_A64], http://ec.europa.eu/eurostat/data/database (accessed August 2023).

Research, development and innovation in agro-food projects from public funding total EUR 15 million over the last decade

Most R&D&I projects are funded by the Ministry of Science and Education. The Croatian Science Foundation, responsible for the selection process of scientific projects, manages the database of projects and the calls for funding from different national and international sources. Over a hundred projects were financed in the fields of agriculture, forestry and food technology between 2013 and 2022, an investment representing more than EUR 15 million (Croatian Science Foundation, n.d.[13]) (Box 4.2).

Box 4.2. Over 100 projects financed by the Croatian Science Foundation in the past decade

Between 2013 and 2022, the Croatian Science Foundation financed 107 projects in the fields of agriculture, forestry and food technology. The total amount of funds invested equals EUR 15 million for the entire period, an average of EUR 140 000 per project. The projects' average duration was four years. The yearly budget saw an increase over time. For example, in both 2014 and 2019, 13 projects were financed. However, the budget for 2019 was more than double that of 2014. In 2022, only one project was financed for the Institute of Agriculture and Tourism in Poreč with a budget of EUR 199 077 (Ruđer Bošković Institute in Zagreb, 2015[16]) (Research Information System of the Republic of Croatia, 2023[17]) (Croatian Science Foundation, 2020[18]) (Croatian Science Foundation, n.d.[13]).

The institutions which obtained the funds are mainly Croatian universities and research institutes, such as the University of Zagreb (which received 50% of the funds), the Josip Juraj Strossmayer University of Osijek (17%), the Croatian Forest Research Institute (8%), the Institute of Agriculture and Tourism in Poreč, and the Institute for Adriatic Crops and Karst Reclamation in Split (Croatian Science Foundation, n.d.[13]).

Projects are mainly connected to innovation, climate change, sustainability and specific species of plants, crops, and animals. The topics are at once diverse and specific: some examples include green infrastructure, forest dynamic, olive leaf, wine, soil conservation and degradation, genetic diversity, intercropping, water erosion, and water pollution (Croatian Science Foundation, n.d.[13]). For instance, between 2017 and 2019, the Faculty of Agriculture of the University of Zagreb received EUR 261 066 to examine the genetic adaptability of new varieties of maize and soybean in terms of their drought tolerance, as drought is the most common cause of unprofitable yields of agricultural crops in Croatia (Križevci University of Applied Sciences, 2021[19]).

Note: Analysis based on data published in the Croatian Science Foundation website, selecting projects using specific agricultural terms.
Source: Authors' elaboration based on the cited references.

CAP measures that foster knowledge transfer and innovation have failed to reach farmers

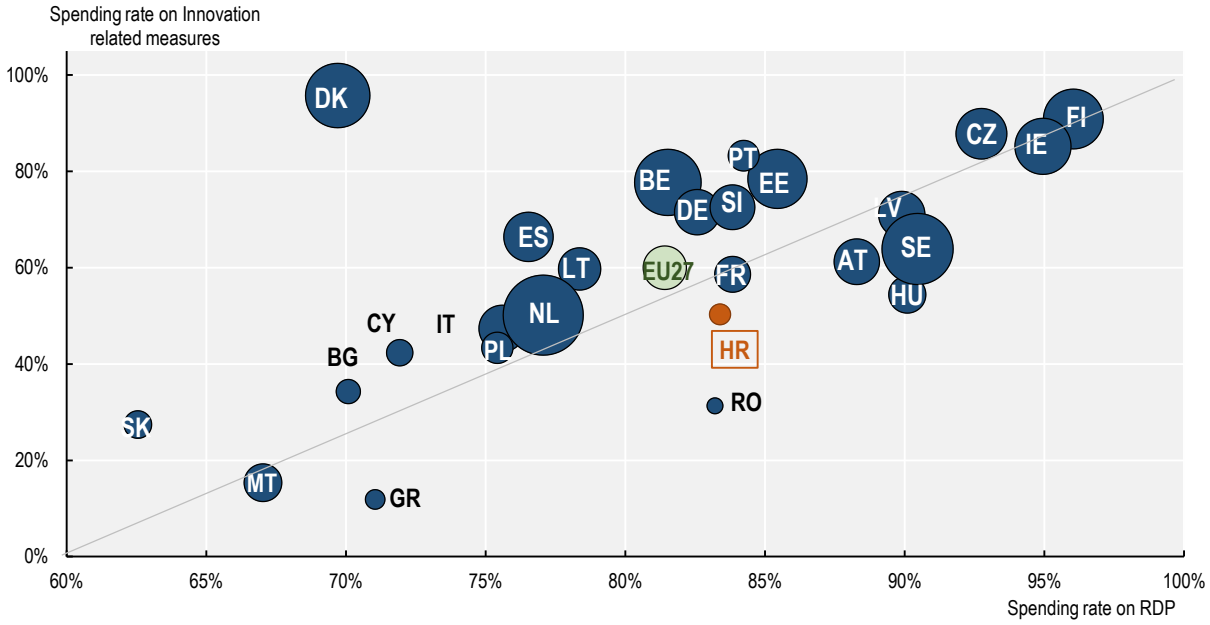
Under the CAP 2014-22, there were three measures aiming to foster knowledge transfer and innovation: knowledge transfer (M1), advice (M2) and co-operation (M16). The final budgets as of 2023 were EUR 6 million, EUR 14 million and EUR 5 million, respectively, after various amendments that reduced them by more than a third of the initial proposal. The sum of these three knowledge and innovation measures represents a very small portion of the overall planned RDP budget (0.77%), below most EU countries and the EU average (2.63%).

When it comes to actual expenditures, this share falls to 0.47% compared to 1.94% for the EU27. This is shown by the size of the bubbles in Figure 4.5, which represents the spending rates on knowledge and innovation measures versus the overall spending on RDP measures for all EU Member States. These rates represent the portion of the planned funding that had actually been spent as of end-2023. All countries (except Denmark) show lower spending rates in knowledge and innovation measures than in all RDP

measures. This points to either less interest of stakeholders to apply for these measures, or the existence of barriers that hamper their availability or accessibility. Croatia is roughly in line with the EU average in terms of overall spending rates for RDP measures, including knowledge and innovation measures. At the end of 2023, Croatia had spent 83% of overall RDP budget, but only 44% of the knowledge and innovation budget (see also Section 2.2.3).

Figure 4.5. Croatia is close to the EU average in terms of spending rates on RDP measures, including knowledge and innovation

Spending rates on knowledge and innovation measures under the rural development funding of the CAP 2014-22, as of 2023



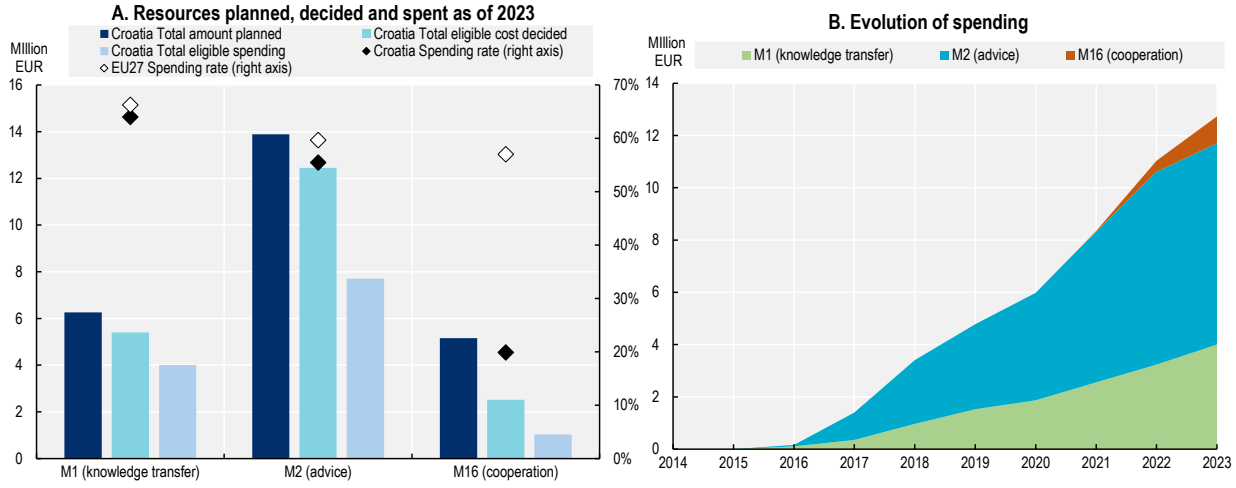
Notes: Knowledge and innovation-related measures encompass knowledge transfer (M1), advice (M2) and co-operation (M16). The funding shown for M16 also includes sub-measures that do not target innovation or knowledge exchange. The total values include both EU and national components. The size of the bubble indicates the share of innovation and knowledge related measures in the rural development programme (RDP) eligible spending. The position of each bubble corresponds to the relation between the spending rates on innovation-related measures (y-axis) and on overall rural development measures (x-axis). Higher values in the y-axis indicate a greater focus on innovation.
Source: Authors' calculations based on (European Commission, 2024[20]).

Analysing individual measures, Figure 4.6 Panel A shows that Croatia spent 64% and 55% of its planned budget for M1 and M2 respectively, which represent levels of performance relatively aligned with the EU average (66% and 60%). This could show that knowledge transfer and advice measures are relatively accessible and of interest to end users (advisors and farmers). In the case of M16, however, only 20% of its funds were spent by the end of 2023, which is significantly lower than the average spending rate for this measure in the EU27 (57%).

Figure 4.6 Panel B shows the evolution of spending over time for the three knowledge and innovation measures. Croatia's spending for M1and M2 started relatively early (2016), while expenditures on measure M16 started extremely late, in 2021. This low and slow spending could reflect a lack of interest of Croatian AKIS stakeholders in projects under this measure, probably tied to the difficulties in applying for and accessing its benefits and low capacity to absorb funding for co-operation activities.

Figure 4.6. Croatia reports low and slow uptakes of CAP measures that foster knowledge transfer and innovation

Resources planned, decided, and spent on knowledge and innovation measures under the rural development funding of the CAP 2014-22 in Croatia



Notes: The funding shown for measure 16 also includes sub-measures that do not target innovation or knowledge exchange. The total values include both EU and national funding. National and regional programmes report financial data to the European Commission on their progress as follows. Planned: Total budget of the programme. Decided: Financial resources allocated to selected projects (project pipeline). Spent: Expenditure reported by the selected projects.
Source: Authors' calculations based on European Commission (2024[20]).

Several barriers may explain the late start and low uptake of measure M16. This measure mainly finances co-operation by groups of different entities – such as EIP Operational Groups – that propose and implement innovative projects. In Croatia, implementation of M16 started in 2018, much later than in other EU Member States. Experts have identified several reasons for its low uptake:

- The design of the first calls, linked to the *de minimis* rule[10] and without the possibility of advance payments for operational groups, may have excluded potential stakeholders.
- The reporting process was considered burdensome for applicants.
- A possible lack of familiarity with the bottom-up approach of the measure. Traditionally, advisors (both private and public) and universities write research projects for the benefit of farmers without necessarily taking their needs into account.

Taking into account this experience from the 2014-22 RDP, Croatia has taken actions to overcome the difficulties and improve the uptake of this type of measure over the 2023-27 period. Thirty advisors have received specific training to become innovation brokers and should have a better understanding of what the co-creation of innovative projects means. The public advisory service has undertaken efforts to better advertise and explain the measure to farmers. The advance payments and reporting process may be revised under the new CAP framework (Intervention 77.03). The authorities also expect that the visibility of successful pioneering projects and the spreading of good practices will encourage more applicants year after year.

Under the new CAP framework, these measures were included in the 2023-27 CSP under new intervention codes. The resources available for knowledge transfer and agricultural advisory services amount to EUR 17.6 million for each of the two interventions (78.01 and 78.02), a respective increase of 180% and 30% compared to the CAP 2014-22. The amount allocated to the intervention that promotes cooperation through EIP operational groups (77.03) is equal to the last planned budget for M16 (EUR 5.1 million).

4.3.2. International co-operation in agricultural R&D and partnerships for agricultural innovation

As an EU Member State, Croatia benefits from established international networks and partnerships

The European Union governance provides a wide range of cross-country networks and partnerships to promote the exchange of knowledge, experience and best practices among AKIS stakeholders of Member States and beyond. Partnership programmes bring together a wide range of actors and are designed to tackle pressing global challenges in agriculture, aligning with the Sustainable Development Goals (SDGs) and European policy objectives (OECD, 2023[21]). This network is an important asset for Croatia's AKIS, particularly given its relatively small critical mass.

Croatian AKIS stakeholders participate in international multi-actor projects from the Horizon 2020 and Horizon Europe calls. These projects facilitate interactive innovation by involving multiple actors from different countries to collaborate on issues such as sustainable farming practices, climate change mitigation, and efficient use of resources.

In Croatia, the Ministry of Agriculture is the contact point for two Horizon 2020 projects directly related to the development and implementation of innovation in the agricultural sector: i2connect (2019-24), which provides training of advisors for supporting innovation development, and FAIRshare (2018-23), which enables the digitalisation of advisory service through the implementation of digital tools. The knowledge gained through i2connect is further disseminated through training courses for advisors, with the goal of creating innovation brokers in the advisory service and fostering their participation in operational groups. The Ministry of Agriculture also participates in other EU initiatives.[11]

The Ministry of Agriculture also co-operates with relevant stakeholders in the field of agricultural advisory services through other networks. Through the Southeast European Network of Advisory Services (SEASN) Croatia works with neighbouring countries from the Southeast Europe (e.g. Montenegro, Serbia, North Macedonia, Kosovo). The Croatian Public Advisory Service also participates in conferences and training organised by the International Academy of Agricultural and Home Economics Consultants (IALB) and is a full member of the European Forum for Agricultural and Rural Advisory Services (EUFRAS).

Croatian AKIS stakeholders have made very little use of available EU funds to partner and implement innovative projects

The set-up of EIP-AGRI operational groups through measure M16 under the CAP 2014-22 is at an early stage in Croatia. The first groups were established in 2019/20. To date, four operational groups have developed and implemented co-operative projects in the field of applied science and practical application of innovative solutions and five are still in the implementation process (operation type 16.1.1).[12]

Most of the projects focus on farming practices, agricultural production systems and soil management, all with objectives of environmental sustainability, which align with the priorities of the funding body (the European Union). Very few of them tackle the challenge of increasing productivity and adding value to production, which are priorities of the implementing body (the government). This mismatch is also observed in the 2023-27 period. Under the new CAP (measure 77.03), the priority themes for funding are also mainly related to environmental sustainability of the sector (bioeconomy, climate change adaptation and mitigation, conservation agriculture, among others), even though many of Croatia's high-priority needs are of an economic nature (see also Section 2.3.2).

The low level of uptake of available EU funds (as explained in Section 4.3.1) shows that financial support for the establishment and operation of EIP operational groups by itself is not a key and sufficient factor for the development of innovation in agriculture. More efforts are needed to boost collaborative innovative processes.

4.3.3. Digitisation, connectivity, deployment and use of digital technologies

The digital transformation of the Croatian economy and society is advancing significantly, especially in the fields of human capital, fibre coverage and the digitalisation of businesses. In 2022, Croatia ranked 21st in the EU Digital Economy and Society Index (DESI). This index positions Croatia above peer countries such as Bulgaria, Romania and Hungary, but below Austria, Lithuania and Italy. Croatia performs better than the EU average in the area of human capital: in 2021, 63% of individuals had basic digital skills and 31% had above basic digital skills (against EU averages of 54% and 26% respectively). The weakest performance areas were connectivity and digital public services (European Commission, 2022[22]) (European Commission, 2023[23]).

The government has launched various initiatives, such as the Digital Croatia Strategy towards 2032, the National Development Strategy until 2030 and the National Recovery and Resilience Plan, aimed at steering the country's digital transformation over the next decade.

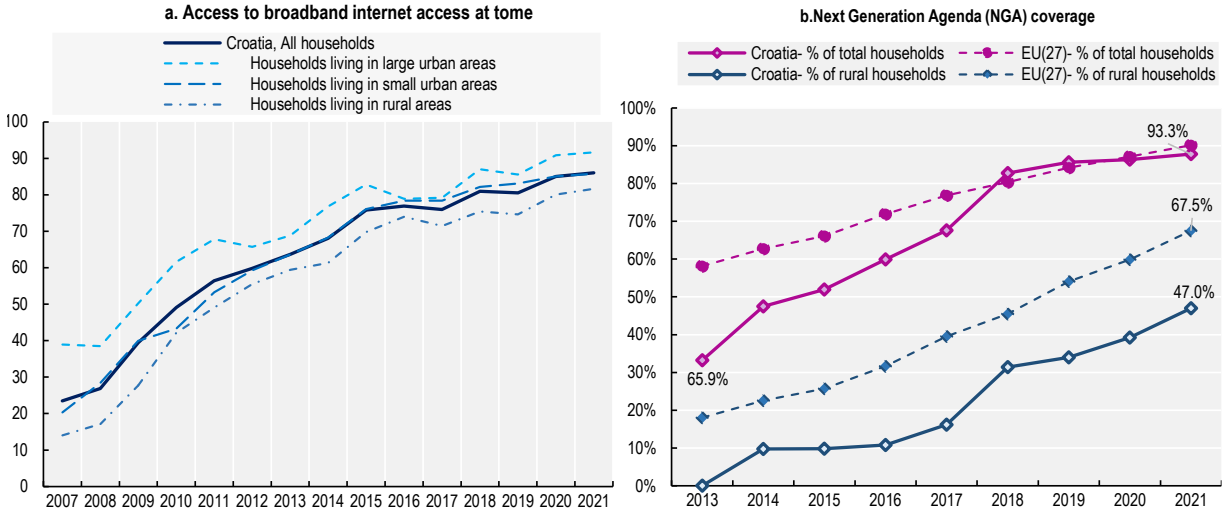
Croatia managed to narrow the rural-urban gap in broadband access but not in access to high-speed Internet

Croatia made significant progress in reducing the broadband access gap in rural areas, both compared to urban areas and to peer countries. In 2021, 82% of rural households had access to broadband Internet at home, compared to 86% for all Croatian households (Figure 4.7, panel a). This brings Croatia closer to the EU27 and the OECD averages (respectively 86% and 89%) and represents a significant increase from 2008, when only 17% of rural household had broadband access (OECD, 2023[24]). Another positive development in connectivity is the allocation of harmonised spectrum for 5G in August 2021.

Nevertheless, a significant gap remains between urban and rural areas regarding the availability of technologies that support high-speed internet, namely the Next Generation Agenda (NGA) coverage, which includes fixed-line broadband access technologies capable of achieving download speeds meeting the Digital Agenda for Europe objective of at least 30 Mbps coverage. While almost 88% of all Croatian households have NGA coverage, only 47% of rural households do, well below the EU average of 67.5% (Figure 4.7, panel b). Coverage by a very high-capacity fixed network is growing, but it is lower than in the rest of the European Union, and in 2021 it amounted to 52%. This situation can be improved, especially in rural areas, where 14% of households have access to a very high-capacity fixed network and 7% to a fibre to the premises network (FTTP), compared to the 37% and 34% EU averages, respectively (European Commission, 2022[25]).

Figure 4.7. The urban-rural gap in broadband Internet access has declined, but a gap persists in high-speed coverage

Households with broadband Internet access and NGA coverage (%)



Note: Next Generation Access (NGA) coverage includes fixed-line broadband access technologies capable of achieving download speeds meeting the Digital Agenda objective of at least 30 Mbps coverage, such as combination of VDSL, DOCSIS 3.0, and FTTP.
Source: Panel a: OECD (2023), Information and Communication Technology database (ICT Access and Usage by Households and Individuals table), http://stats.oecd.org/ (accessed July 2023); Panel B: Broadband Coverage in Europe 2021, mapping progress towards the coverage objectives of the digital agenda.

The European Commission (2020[7]) highlights that the digitalisation of the Croatian agricultural sector is limited, hindering opportunities for improving Croatian agriculture's economic sustainability and resilience while preserving its environmental sustainability. Improving access to fast broadband and to digital platforms can contribute to making rural areas more attractive to live in and to bridge the rural-urban divide. If the gap in rural areas is not mitigated, it may lead to digital and social exclusion and present an obstacle to developing agricultural businesses.

Actions to support the digital transition are included in most components of the RRP, reflecting the cross-cutting nature of the envisaged digitisation efforts. In terms of connectivity, the plan includes investments to increase national broadband coverage with very high-capacity networks (VHCN) in areas where there is insufficient commercial interest. These investments (for around EUR 126 million) are expected to help reduce, but not close, the digital divide between urban and rural areas in Croatia (European Commission, 2021[26]).

Croatia is making efforts to improve the provision of digital public services

Croatia faces many challenges regarding the digitalisation of public services. According to the DESI index, in 2022 the country ranked 23rd in the European Union in this area. While performance is relatively good in terms of open data (3 percentage points more than the EU average in 2021), performance is poor in the rest of the indicators measuring progress in this area: in 2022, only 69% of internet users uptake online public services compared with the EU average of 74%. The use of prefilled forms reached a score of only 38 points, compared to 68 in the European Union. The availability of digital public services for citizens scores 71 versus an EU average of 77, while for businesses it scores 67 versus 84 for the EU. These figures evidence that Croatia must still make efforts to reach the EU 2030 Digital Decade target of all key public services offered fully online (European Commission, 2022[22]) (European Commission, 2023[23]).

The RRP includes several projects related to digitalisation, such as the Action Plan for the Digital Transformation of Agricultural Public Services, which aims to digitalise at least 30 public services by Q3-2025 (with a budget of EUR 1.9 million) along with the establishment of a Smart Agriculture Platform by Q4-2025 (budget EUR 6.6 million) and a traceability system by Q3-2023 (budget EUR 1.7 million).

Policies promoting digital agriculture are in place, although more efforts are needed

Several CAP interventions seek to support the digital transition of the agricultural sector. They include initiatives for the development of digital skills, the transfer of digital knowledge and for raising awareness about the benefits of digitalisation for the productivity and sustainability of farms. In addition, measures to support investments in primary production aimed at using innovative and digital technologies are directed to applicants who have completed relevant education and training. Interventions for local infrastructure that contribute to digitisation and invest in digital technologies are also promoted through specific selection criteria. These measures seek to complement and create synergies with the above-mentioned investments on digital infrastructure and on the digitisation of public services.

While data on the uptake of precision farming and digital technologies is not available, the implementation of the 2014-22 RDP in Croatia indicates a low level of investment in digital technologies: only 1.25% of the budget of all investment projects went to digital tools (European Commission, 2020[7]).

The government is considering the establishment of digital innovation centres related to agriculture (European Digital Innovation Hubs) within the Digital Europe Programme. This programme would be implemented by the Ministry of Regional Development and EU Funds.

Croatia benefits from reliable governance over data use provided by the European Union

Croatia has established an overarching data governance framework, including specific policies for agriculture data, primarily based on the EU General Data Protection Regulation (GDPR) integrated into Croatian law since 2018.

The Ministry of Agriculture provides accessible data through its website, covering a wide range of subjects.[13] Collaboration with the private sector facilitates the collection of specific data, such as agro-food product prices, in compliance with EU regulations.[14] The Farm Accountancy Data Network (FADN) survey gathers detailed farm-level information from a sample of agricultural holdings, ensuring the confidentiality of individual data while publishing aggregated statistics.

Other publicly available databases include those managed by the Croatian Bureau of Statistics, the Croatian Plant Genetic Resources Database, and the Farm Animal Gene Bank. In addition, the website of the Paying Agency in Agriculture, Fisheries and Rural Development publishes statistics and performance indicators on the RDP, along with an online land parcel viewer (ARKOD).

The government is increasingly using digital data and technology to implement and monitor its policies

Digitalisation is an opportunity for better policy design and implementation (OECD, 2019[27]). Several innovative digital initiatives have recently been developed and will be further enhanced as part of the process of reinforcing the AKIS, supported by the CAP funds and the investments outlined in the RRP.

Some initiatives aim to enhance the government's use of data for more effective policy implementation, such as the Area Monitoring System (AMS), a new system for monitoring agricultural areas eligible for CAP payments that was introduced in 2023, as required by the European Union. Using Copernicus Sentinel Satellite or similar data, this system facilitates monitoring the eligibility conditions of area-based schemes and allows for early warnings to farmers regarding their compliance with eligibility criteria and obligations so that they can amend these in a timely manner. This complements the AGRONET system

for processing subsidy applications, where farmers have completed applications exclusively electronically since 2015.[15]

Other initiatives promote the use of digital tools to ease the transfer of information and knowledge to farmers. The Directorate for Professional Support to the Development of Agriculture has introduced applications such as e-Advisor, Phyto View, Questions and Answers (Q&A), as well as the development of an online training system for farmers and officials (e-Learning). These tools complement other educational activities offered by the advisory service. They also improve the collection of relevant knowledge and provide timely information to agricultural advisors and farmers to inform their decision making (Section 4.4.2).

There is no evidence on the use of these digital tools by farmers that allows to conclude on their effectiveness in meeting the objective of transferring knowledge and information. It is evident that barriers may still exist for some farmers in accessing these modern means of receiving information, but this should not prevent the government from continuing to develop innovative tools, enhancing their content and promoting their use. The involvement of the public advisory service in the Horizon 2020 project FAIRshare[16] should contribute to this achievement. This collaborative project created a repository of digital tools used in agriculture, focussing on the exchange of knowledge and experiences in the development, implementation, and use of such tools among peer countries (Austria, Croatia, Lithuania, Portugal, Serbia and Slovenia).

Other digital tools developed during the COVID-19 pandemic period have proven their efficacy and are still in place, such as the National Internet Market Platform launched by the Ministry of Agriculture to provide a digital marketplace for Croatian agro-food products. In view of the spontaneous development of other digital platforms specialised in the sale of agricultural products and equipment, the government has opted to let the market further develop this segment and to support the development of this type of direct sales to promote short and local value chains, including through EIP-AGRI projects (Section 5.1.3).

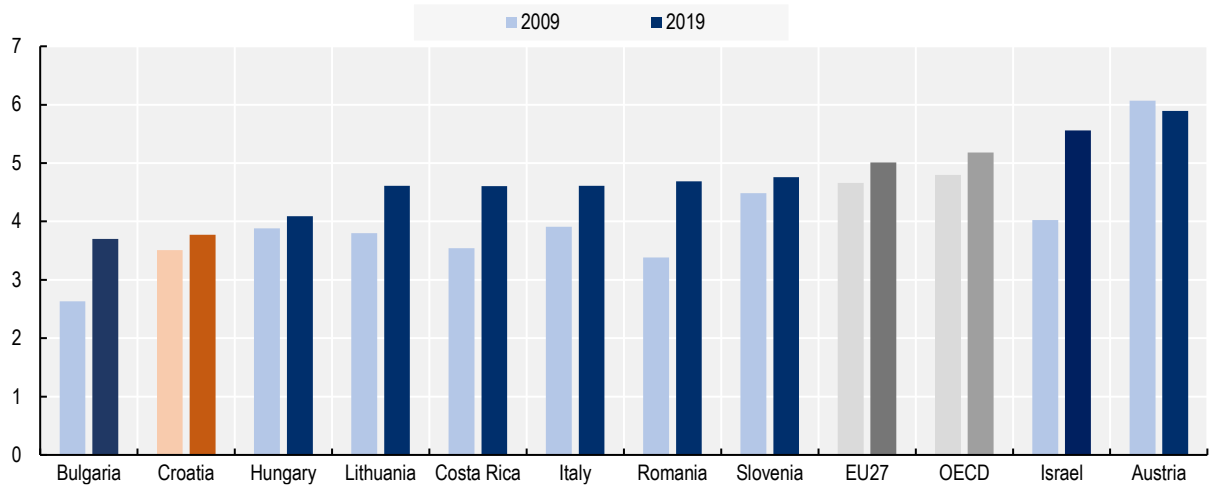
4.3.4. Protection of intellectual property rights

Croatia offers a low level of IPR protection compared to European and OECD countries...

Although the European Union has a common framework and supranational institutions governing the protection of intellectual property rights (IPRs), each Member has its own national system of intellectual property protection. Croatia has been a member of the European Patent Organisation (EPO) since 2008. According to the index of patent protection of the World Economic Forum, Croatia offers a low level of IPRs protection compared to other EU Member States and OECD Members. This has not improved significantly over the past decade (Figure 4.8). In 2019, Croatia's index was 3.8, below the EU and OECD averages (5.0 and 5.2 respectively) and below peer countries such as Romania, Lithuania, and Hungary.

Figure 4.8. Improvement in intellectual property protection has been limited

Evolution of the intellectual property protection index in Croatia and selected peers



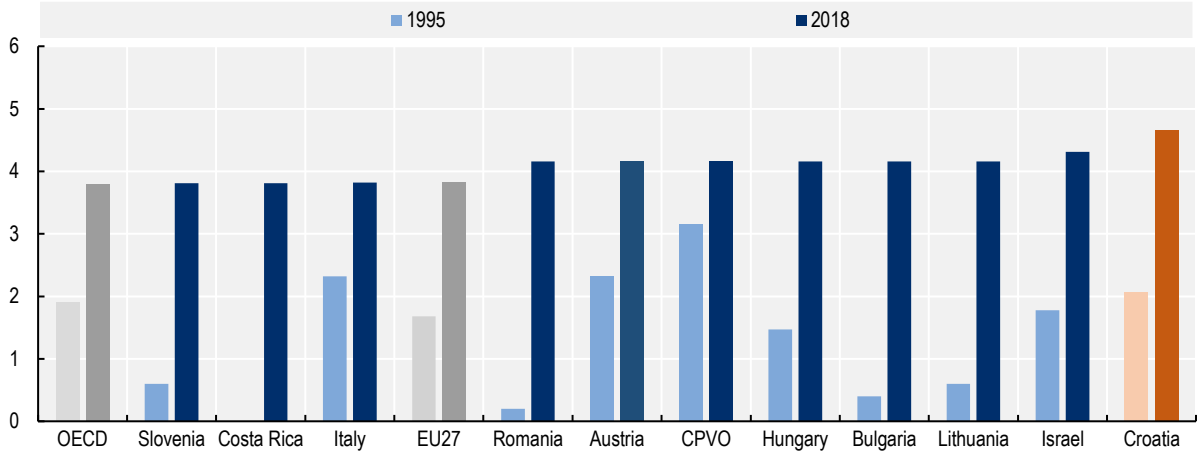
Note: Values for the OECD and EU27 show the simple averages of member-country indices. The measure of intellectual property protection derives from the Executive Opinion Survey of the World Economic Forum in response to the question "In your country, to what extent is intellectual property protected?" [1 = not at all; 7 = to a great extent]. The survey is used to calculate the Global Competitiveness Index (GCI), which captures the microeconomic and macroeconomic foundations of national competitiveness.
Source: Authors' elaboration based on World Economic Forum (2019[28]).

...but is at the top of the EU ranking in terms of plant IP protection levels

EU Member States have national IPR systems protecting their plant varieties and agricultural-related innovations. National systems are based on certain common standards defined by international conventions, such as the International Union for the Protection of New Varieties of Plants (UPOV) and the WTO Agreement on Trade-Related Aspects of Intellectual Property Rights (TRIPS). Croatia first adopted a domestic Plant Variety Protection Act in 1997 and adhered to the 1991 UPOV convention in 2001. Subsequent amendments to the domestic legislation and additional regulations have increased the level of protection, including by extending the years of protection, limiting the farmers' exception and broadening the patent scope to other domains related to plant breeding and agriculture. These developments have resulted in a significant increase in Croatia's level of IP protection for plant varieties: between 1995 and 2018, the index of legal protection for plant varieties increased from 2.1 to 4.7, exceeding the level of protection of the other EU Members[17] (Figure 4.9).

Figure 4.9. Croatia has a very high level of IP protection for plant varieties

Evolution of the index of legal IPR protection for plant varieties in Croatia and selected peers



Notes: CPVO: Community Plant Variety Office. EU27 is the simple average of Member countries' indices, which are built using national legislation. The index scores from lowest (0) to highest protection (5).
Source: Campi and Nuvolari (2020[29]). Data available at: www.openicpsr.org/openicpsr/project/121001/version/V1/view.

4.3.5. Education and training

A relatively large supply of agricultural education programmes contrasts with the low level of formal education among Croatian farmers

Professional agricultural education in Croatia starts at the high school level. There are 47 secondary schools across the country offering specialisations in agriculture . However, data provided by the Ministry of Agriculture shows a negative trend in the number of students enrolled in agriculture and agro-food programmes, which fell by 18% between the 2017/18 and 2022/23 academic years – more than twice the average drop across all study programmes. Croatia also offers 70 higher education programmes at different levels – undergraduate, graduate, and postgraduate – delivered by 11 institutions. Formal agricultural education does not attract the desired number of students, however, with the number of applicants falling short of enrollment quotas (Ministry of Agriculture, 2022[8]). These developments can be partly explained by negative demographic trends and the low interest among young people in farming activities.

Despite the relatively large supply of agricultural education programmes, the education level of Croatian farm managers remains low. In 2020, most (92%) had only practical agricultural experience without any type of formal training. This is a high proportion compared to the EU average of 72%, and there has been little improvement since 2010 (Table 4.2). Only 6% of farm managers had basic training and barely 2% received a formal agricultural education. Young farmers (under 35), however, were more likely to have received formal agricultural education, with almost 24% of them having received basic or full training, although this is still below the EU average of 41% (Eurostat, 2023[30]). Nevertheless, as seen in Section 1.4.1, many young and highly educated people are entering the sector.

This situation is not exclusive to the agro-food sector. There is a general decline in higher education enrolment in Croatia with high dropout rates. This has led to low tertiary education attainment rates, especially in rural areas, with the gap with urban areas widening over time. At the same time, the country's higher education system is not adequately meeting labour market demands and learning needs, reflected in high unemployment rates for graduates and low participation in lifelong learning compared to other EU countries. This highlights a mismatch between education and employment needs (OECD, 2023[31]).

Table 4.2. Most Croatian farm managers do not have formal training

Training level of Croatian farm managers, 2010 to 2020

Training level of farmers	Croatia					European Union (EU27)	
	2010	2013	2016	2020	2020	2020	2020
			All farmers	All farmers	Young farmers	All farmers	Young farmers
	(Thousands of farmers)						
Practical experience only	221.7	148.0	119.8	132.0	7.9	6 560.4	346.4
	95.0%	94.0%	89.1%	91.7%	77.0%	72.4%	59.0%
Basic training	6.5	5.9	11.4	8.5	1.72	1,584	116.5
	2.8%	3.8%	8.5%	5.9%	17.0%	17.5%	20.0%
Full agricultural training	5.0	3.5	3.3	3.4	0.69	922.7	125.9
	2.2%	2. 3%	2.4%	2.4%	6.7%	10.2%	21.4%

Notes: Basic agricultural training is any training course completed at a general agricultural college and/or an institution specialising in certain subjects (including horticulture, viticulture, silviculture, pisciculture, veterinary science, agricultural technology and associated subjects); a completed agricultural apprenticeship is regarded as basic training.
Full agricultural training refers to any training course continuing for the equivalent of at least two years' full-time training after the end of compulsory education and completed at an agricultural college, university or other institute of higher education in agriculture, horticulture, viticulture, silviculture, pisciculture, veterinary science, agricultural technology and associated subjects.
Source: Eurostat (2023), Agricultural holdings and utilised agricultural area by training, age and sex of farm managers [EF_MP_TRAINING].

Various initiatives seek to better align the education system with labour market needs

Croatia has taken steps to align its education system with labour market demands through initiatives such as the *Croatian Qualifications Framework* (CROFQ) launched in 2012, which includes 20 secondary educational programmes tailored to agricultural and food technician training needs. Deficiencies in digital technology and environmental sustainability training persist within these programmes, and efforts to bridge these gaps are underway. Initiatives like the *Modernisation of the Vocational Education System*, conducted by the Agency for Vocational and Adult Education and funded by the European Social Fund (ESF), are introducing new curricula such as the agro-ecological technician programme to address the unmet needs of the sector.

The 25 *Regional Centres of Competence* spread across the country play a significant role. They implement innovative learning models and work in close collaboration with economic entities and employers. They focus on specific subsectors, including agriculture, with an emphasis on work-based learning, innovation, the application of new digital technologies and a comprehensive approach to economic and environmental sustainability. In 2022, Croatia introduced a promising voucher-based adult training system that could benefit farmers, with emphasis on green and digital skills (Eurydice, 2023[32]) (OECD, 2025[33]).

Croatia's higher education system is experiencing significant transformation, driven by a comprehensive modernisation agenda aimed at enhancing its attractiveness and relevance. Key initiatives include the *Act on the Quality Assurance in Higher Education and Science* (effective January 2023), which introduced a centralised accreditation process for new study programmes with inputs from the Croatian Employment Service to ensure alignment with labour market needs and qualification standards (OECD, 2023[31]).

As seen in Section 4.3.1, CAP measures fund training and extension services to farmers. The government also encourages education and training by incentivising farmers to participate in courses as a requirement for benefitting from certain Pillar 2 measures related to environment, climate change, organic farming, and animal welfare, and from some of the eco-schemes. Self-employed farmers can deduct state support for education and training, or research and development incentives from their tax base. Education and experience criteria are considered in the evaluation process of certain public calls providing additional points to applicants, such as in bids for state-owned agricultural land.

4.4. Adoption of innovations and R&D performance

4.4.1. Outputs of R&D investment in agro-food science

Table 4.3 shows patents and publications in agro-food as outcomes of the agriculture and food science R&D. Croatia has a relatively high specialisation in publications on agro-food science, which represented 7% of total publications at the national level. This level of specialisation is higher than the EU and the OECD averages (both close to 5%). Despite this relatively high level of specialisation, only 4.5% of Croatian publications on agro-food sciences are among the top 10% most cited (an indicator of excellence), well below the EU and OECD averages (12%). Croatia's contribution to global agro-food-related publications is also low (0.3%), although relatively similar to the contribution of peer countries. Almost 28% of Croatian agro-food-related publications are the result of collaborations with foreign partners, which is below the EU27 (39%) and OECD (34%) averages. Collaborations with foreign partners provide avenues for knowledge sharing that can potentially derive in knowledge inflows.

Table 4.3. Agriculture and food science R&D outcomes, 2011-20

Agriculture and food science R&D outcomes, 2011-20

	Specialisation: Agro-food science outputs as a share of country's total (%)		Contribution: Country's share of world agro-food science output (%)		Collaboration: Agro-food outputs with foreign partners as a share of country's total agro-food outputs (%)		Importance/visibility: Outstanding agricultural/biological science publications as a share of the country's total in this field (%)
	Patents[1]	Publications[2]	Patents[1]	Publications[2]	Patents[1]	Publications[2]	Publications (top 10% most cited)[3]
Croatia	3.7	7.0	0.01	0.3	36.5	27.7	4.5
Romania	3.8	2.8	0.03	0.3	22.9	20.9	5.1
Slovenia	5.5	5.1	0.07	0.2	27.7	35.2	7.7
Hungary	5.8	7.3	0.12	0.4	39.7	32.1	5.0
Lithuania	16.7	6.5	0.06	0.1	27.9	24.5	4.4
Bulgaria	7.0	7.9	0.03	0.2	33.8	25.3	2.4
Italy	5.9	4.8	2.61	3.0	16.9	31.0	13.1
Austria	3.7	4.4	0.81	0.5	25.5	52.7	12.5
Costa Rica	7.5	26.2	0.01	0.1	94.3	55.9	3.6
Israel	5.3	3.8	1.01	0.4	13.8	37.0	12.8
EU27	5.0	4.9	27.34	23.3	14.7	38.7	12.0
OECD	4.1	4.7	86.70	60.0	10.8	33.8	11.9

Notes: 1. Patents field under the Patent Co-operation Treaty (PCT) by earliest filing date and location of inventors using fractional counts for Specialisation and Contribution, and using whole counts for Collaboration. Agro-food includes patents from IPC classes: A01, A21, A22, A23, A24, B21H 7/00, B21K 19/00, B62C, B65B 25/02, B66C 23/44, C08b, C11, C12, C13, C09K 101/00, E02B 11/00, E04H 5/08, E04H 7/22 and G06Q 50/02.

2. Publications in the field of agricultural and biological science refer to the SCOPUS 2-digit All Science Journals Classification (ASJC) and include the following categories: agronomy and crop science, animal science and zoology, aquatic science, ecology/evolution/behaviour and systematics, food science, forestry, horticulture, insect science, plant science, soil science, and miscellaneous agriculture/biological sciences. Data are based on the fractional counts.

3. Top 10% of the world's most cited publications in the field of the agricultural and biological science.

Source: Authors' calculation based on OECD (2023), STI Micro-data Lab: Intellectual Property Database, http://oe.cd/ipstats (accessed August 2023); and OECD (2023), OECD STI calculations based on Scopus Custom Data, Elsevier, Version 1.2018; and 2018 Scimago Journal Rank from the Scopus journal title list (accessed August 2023).

With only 3.7% of patents in the field, Croatia has a relatively low level of specialisation in agro-food sciences, below the average of the European Union (5%) and the OECD (4%). Croatia's contribution to the world's agro-food patents, at just 0.01%, is one of the lowest among peer countries. However, collaboration with foreign partners in this area is relatively high: over 36% of Croatian patents in the agro-food sector are the result of such collaborations, a share exceeded only by Costa Rica and Hungary among peer countries.

4.4.2. Successful cases of innovation for environmental sustainability

This section presents examples of cases where innovation contributes or has the potential to contribute to the environmental sustainability, productivity, and resilience of the agro-food sector in Croatia.

Innovative methods to produce local organic seeds

Organic farming has experienced significant growth over the past decade (Section 1.3.3) and its expansion is a policy objective of Croatia and the European Union (see also Section 3.2.3). The effects of climate change are increasingly being felt on the Croatian agricultural landscape. Farmers must adapt to the changing climatic conditions; for this, they need resilient plant varieties. In Croatia, most organically produced seeds are imported. Traditional varieties developed under local conditions tend to develop traits of resilience, particularly in the face of extreme weather conditions, and while they generally have lower yields than hybrids, they represent a potentially important source of genes for subsequent plant breeding, including for organic production.

The Eco-seeds project,[18] carried out by the Croatian Association of Organic Producers and funded by EIP-AGRI, seeks to develop seed varieties that are better adapted to local conditions and to organic production, and preserve plant genetic resources *in situ*, *ex situ* and *on farm*. Developing applied research and testing different varieties in farm production to be able to select the most suitable and economically viable ones require the collaboration of farmers and scientific institutions. Three organic growers are directly involved in this project and the scientific part is covered by the Institute for Agriculture and Tourism in Poreč.

Farmers are encouraged to engage in organic seed production through different activities. They receive training and benefit from knowledge transfers from the scientific institution. By developing farmers' skills in saving seeds on the farm and registering their seed production, local resilient organic seeds will be available for others and organic production will progress, contributing to the environmental sustainability of the sector.

Grass Ceiling: Living labs to empower rural female innovators

Rural women face multiple barriers in leading innovation, such as limited access to land, property and financial resources, lack of access to information, lack of training, mentoring and professional networks. In Croatia, only 30% of family farms are owned by women. Women in rural areas are often in less favourable economic and social positions, and their work is often undervalued due to traditional gender roles and attitudes (see also Section 1.4.2). Leveraging women's knowledge and experience could unveil missed opportunities in identifying local challenges and offering innovative solutions (OECD, 2021[34]). Grass Ceiling, a three-year (2023-25) multi-actor project funded by Horizon Europe, aims to empower rural women and increase the number of socio-ecological innovations led by women in agriculture, the rural economy, and rural communities. The Croatian Chamber of Agriculture and the Faculty of Agriculture of the University of Zagreb are jointly participating in this EUR 2.8 million project (Croatian Chamber of Agriculture, 2023[35]).

Living labs have been established in nine countries working together on training 72 female innovators in rural areas. Each living lab brings together and trains between six and eight women. They support female innovators, strengthen and measure their innovative ideas, and seek to transform gender norms and

stereotypes by sharing and gathering insights into policies towards rural women innovators and practical experience. Participating women are encouraged to develop skills and define the key problems they face in their work and life in the countryside.

In Croatia, Grass Ceiling activities engage rural women innovators and agricultural organisations (family farms, crafts, associations, co-operatives, local action groups, etc.) through living labs, fostering discussions on business, innovation, and measures to enhance the status of rural women. These initiatives involve local stakeholders and highlight challenges such as administrative barriers, land management, and knowledge transfer (Croatian Chamber of Agriculture, 2023[36]). In addition to the efforts to train and empower women, a first focus group for men on the position of women in rural areas was held in September 2023 to understand and address obstacles and opportunities for women in agricultural innovation.[19]

Digital platforms to support decision making and promote smart agriculture

Digitalisation offers the potential to help address the productivity, sustainability and resilience challenges facing agriculture. National governments have an important role in addressing bottlenecks to adoption, including by ensuring appropriate incentives for innovation as well as serving as knowledge brokers and facilitators of data-sharing to spur inclusive, secure and representative data ecosystems (McFadden et al., 2022[37]).

The digital platform e-Advisor, in place since 2018, is the result of public efforts to efficiently transfer relevant knowledge and information to farmers and support their decision-making. The system includes a module for collecting existing advisory knowledge and information, a central application module for analytics based on web technologies, and a mobile application on the Android platform, which serves to distribute information to farmers and advisors, in accordance with regional and business specificities. In addition, the Phyto View application − created to monitor pest and diseases − enables the systematic collection of data and information on the presence of harmful organisms that serves as a basis for early warning system, decision making and reporting.

Ongoing efforts funded through the RRP seek to develop a central agriculture information system (e-Agriculture) that will serve as a comprehensive knowledge reservoir disseminated through e-Advisor. Other innovative services are being developed, including the acquisition of modern equipment for monitoring the stages of growth and development of plants and the appearance of harmful organisms (e-Monitoring). Information collected through IoT technology will be consolidated on the e-Advisor platform and made available to users in real time. Improving the quality of the plant protection advice will allow for reduced and timely application of pesticides and contribute to environmental sustainability (Ministry of Agriculture, 2022[8]).

4.5. Conclusions

The performance of Croatia's innovation system is still relatively low, but it is improving, steadily narrowing the country's gap with other European countries. The main challenges are: strengthening investments and co-operation among stakeholders in AKIS, particularly farmers and the private sector, improving the education and skills, and encouraging digitalisation.

Encouraging innovation in the agro-food sector is a strategic objective of the Croatian government. Meeting this objective requires overcoming structural challenges such as low levels of public and private investment in agricultural R&D, the fragmentation of the research landscape, and the low critical mass. Croatia's global engagement in international partnerships and EU networks has great potential for Croatia and could be more effective.

The Croatian AKIS is highly fragmented, moderately diverse, deeply influenced by state-funded bodies, and with a strong emphasis on public advisory services. While co-operation between AKIS stakeholders occurs in an *ad hoc* manner, a more structured co-ordination effort focused on the needs of farmers is so far absent. The country has a rich and experienced research community, with strong scientific and academic institutions operating in a fragmented environment. Despite its potential, the private sector has only a limited role in generating and transferring knowledge. Recent and ongoing policy efforts seek to strengthen the connection and integration among public and private actors, and ensure more efficient information and knowledge flows.

Public farm advisory services are well-established and accepted by farmers but face challenges to its capacity to respond to farmers' needs. The existing system, with too few advisors increasingly occupied with EU administrative requirements, is currently shifting towards a more diverse and agile model that includes private agents.

Available measures that foster knowledge transfer and innovation fail to reach farmers satisfactorily. AKIS stakeholders have made very little use of the available EU funds to partner and co-operatively implement innovative projects. Financial support by itself has not been sufficient to foster innovation in agriculture, although the government's effort to establish a network of innovation brokers is promising.

Despite the availability of agricultural educational programmes, farmers have a low level of training. This prevents them from embracing the benefits of innovation opportunities and may slow the uptake of innovative solutions. Various initiatives are underway to better align the educational system with the needs of the labour market.

Croatia managed to narrow the rural-urban gap in terms of broadband access, but a gap persists in access to high-speed internet. While still lagging, the provision of digital public services is improving. Policies promoting digital agriculture are in place, although more efforts are needed to improve digital infrastructure and skills in rural areas, and to increase the use of digital data and technology as important means to modernise agriculture and improve its productivity and sustainability.

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Notes

[1] Innovation Leaders have a relative performance above 125% of the EU average; Strong Innovators have a relative performance between 100% and 125% of the EU average; Moderate Innovators have a relative performance between 70% and 100% of the EU average, and Emerging Innovators have a relative performance below 70% of the EU average.

[2] This corresponds to the XCO intersectoral goal of the modernisation of the sector by encouraging and exchanging knowledge, innovation and digitization in agriculture and rural areas, and promoting their application.

[3] The term Agricultural Knowledge and Innovation Systems (AKIS), normally used in the European context, roughly corresponds to the Agricultural Innovation System (AIS), which is the term usually used by the OECD in its Productivity, Sustainability and Resilience Framework (OECD, 2020[38]).

[4] The degree of interconnectedness among AKIS actors within a country varies from integrated to fragmented. Knierim (2015[39]) characterises *fragmented* AKIS in a context where diverse actors operate in parallel with limited co-ordination, hindering the effective sharing of knowledge, resources, and experiences both horizontally and vertically. In contrast, an *integrated* AKIS features well organised co-ordination structures that facilitate interaction and collaboration among actors, characterised by a shared vision, clear roles, and effective mechanisms for co-operation and joint action, thereby enhancing knowledge sharing and interactive innovation processes (modernAKIS, 2023[40]).

[5] The European Innovation Partnership for Agricultural Productivity and Sustainability (EIP-AGRI) is the European Commission's main policy tool for promoting bottom-up multi-actor public-private agricultural innovation partnerships, as well as for giving methodological support and providing a networking platform to local operational groups (OGs). An operational group is a group of people with complementary knowledge, who co-create practical solutions for agriculture, forestry, and rural communities in an innovation project. They are composed of farmers, advisers, researchers, business, non-governmental organisations, etc. (OECD, 2023[21]).

[6] An example is the project Optimization of Soil management and Adaptation of Agroecosystems and Agrotechnical Measures to Climate Change (AGROEKOTEH), co-financed by the European Union and in which HAPIH collaborates with the Faculty of Agrobiotechnical Sciences.

[7] As of 2023, the Faculty of Agriculture of the University of Zagreb was participating in 46 international projects funded by Horizon 2020, Horizon Europe, Cost, Life, Prima and Erasmus+.

[8] The Directorate for Professional Support to the Development of Agriculture has been participating in the Horizon 2020 projects DESIRA, NEFERTITI, FAIRshare, i2connect and PLAID as well as in modernAKIS Horizon Europe, Climate Farm Demo and ClimateSmart Advisor.

[9] See https://bc-institut.hr/en/about-us/.

[10] Under the most recent regulation applicable to agriculture (Commission Regulation (EU) 2019/316), a single beneficiary may receive up to EUR 20 000 of *de minimis* aid during any period of three fiscal years. This maximum amount may be increased to EUR 25 000, provided that the country has in place a central

register of *de minimis* aid and that it does not spend more than 50% of its total *de minimis* aid envelope on one particular agricultural sector.

[11] For example, in NEFERTITI - Networking European Farms to Enhance Cross Fertilisation and Innovation Uptake through Demonstration (2018-22), DESIRA - Digitisation: Economic and Social Impacts in Rural Areas (2019-23), modernAKIS - Modernisation of Agriculture through more efficient and effective Agricultural Knowledge and Innovation Systems (2022-29), Climate Farm Demo - A European wide network of pilot farmers implementing and demonstrating climate smart solutions for a carbon neutral Europe (2022-29), ClimateSmartAdvisors - Connecting and mobilising the EU agricultural advisory community to support the transition to Climate Smart Farming (2023-30).

[12] Another nine operational groups benefited from operation type 16.4.2 to promote short supply chains and local markets. Another nine operational groups benefited from operation type 16.4.2 to promote short supply chains and local markets.

[13] See https://poljoprivreda.gov.hr/otvoreni-podaci/5139.

[14] Data on prices of selected agro-food products are collected in accordance with the Ordinance on data Collection and Reporting of Agricultural Products (OG. N0. 145/13).

[15] See https://agronet.apprrr.hr/.

[16] FAIRshare stands for Farm Advisory Digital Innovation Tools Realized and Shared.

[17] Croatia and Denmark are both at the top of the list of EU Member States with the same index of legal protection for plant varieties.

[18] The full name of the project is: Innovative methods of development and production of ecological seeds and seeds of preserved varieties in order to preserve biodiversity and develop the knowledge base in rural areas (https://eu-cap-network.ec.europa.eu/projects/eco-seeds-innovative-methods-development-and-production-organic-seeds-and-seeds_en).

[19] This section is based on the cited references and additional information published by the Croatian Chamber of Agriculture (https://komora.hr/).

5 Food systems

Croatia has introduced a broad set of policies to tackle the “triple challenge” of food systems. Addressing these issues together requires a co-ordinated approach as the relevant responsibilities are generally distributed across jurisdictions, government agencies and levels of government. This chapter looks into the agro-food supply chain and selected specific food system-related policy areas which are drawing growing attention among OECD Members: market regulation and competition issues, food assistance programmes and food waste. It also examines Croatia’s policies for encouraging healthy diet and consumption choices and its approach for promoting policy coherence and involving stakeholders in the regulatory process.

Key messages

- Croatia, as most OECD Members, does not have a co-ordination body or mechanism that comprehensively covers food systems policies. Inter-ministerial co-ordination for food systems-related policies is key to facilitating the identification of potential trade-offs and synergies, and to discuss how best to address them.
- Food markets are functioning well and are well integrated with global value chains. There is a relatively low degree of market concentration in the value chain. Farmer co-operatives are rare and policy interventions to promote cooperatives have had low up-take to date.
- A wide array of policies has been developed to encourage healthier food choices, but the prevalence of obesity is higher than the EU average and is growing at a faster pace. Dietary risks are a major contributor to mortality in Croatia.
- Food waste per inhabitant is low and the country expects to further reduce it by 30% by 2028. The capacity to treat this waste stream is growing, but remains well below the EU average. This lack of capacity contributes to the high contribution of waste to overall GHG emissions, which is more than double the OECD average.
- Croatia's regulatory policy framework has shown significant progress in the past decade with the development of a system of regulatory impact assessment (RIA) and a legislative framework for stakeholder engagement. This can help navigate the triple challenge of ensuring food security and nutrition for all, providing livelihoods to farmers and others in the food chain and promoting rural development, while ensuring environmental sustainability. However, the scope of RIAs is limited and stakeholder consultations rarely occur at early stages. The use of these regulatory management tools in the negotiation phase of EU regulations is also limited.

5.1. General landscape of the agricultural and livestock supply chain, including market concentration

Food systems cover all elements and activities related to producing and consuming food, as well as their effects (OECD, 2021[1]). They comprise all institutions, people, places and activities that participate in growing, processing, transporting, selling, marketing, and consuming food (Food Systems Dashboard, n.d.[2]). This section will describe the landscape of the agricultural supply chain to provide context for the rest of the chapter. While it addresses policies, this section is more descriptive in nature. It presents the distribution of value added across the agro-food supply chain (5.1.1), market concentration in processing and retail (5.1.2), co-operation (5.1.3), logistics and integration into global value chains (5.1.4), and responsible business conduct in agricultural supply chains (5.1.5).

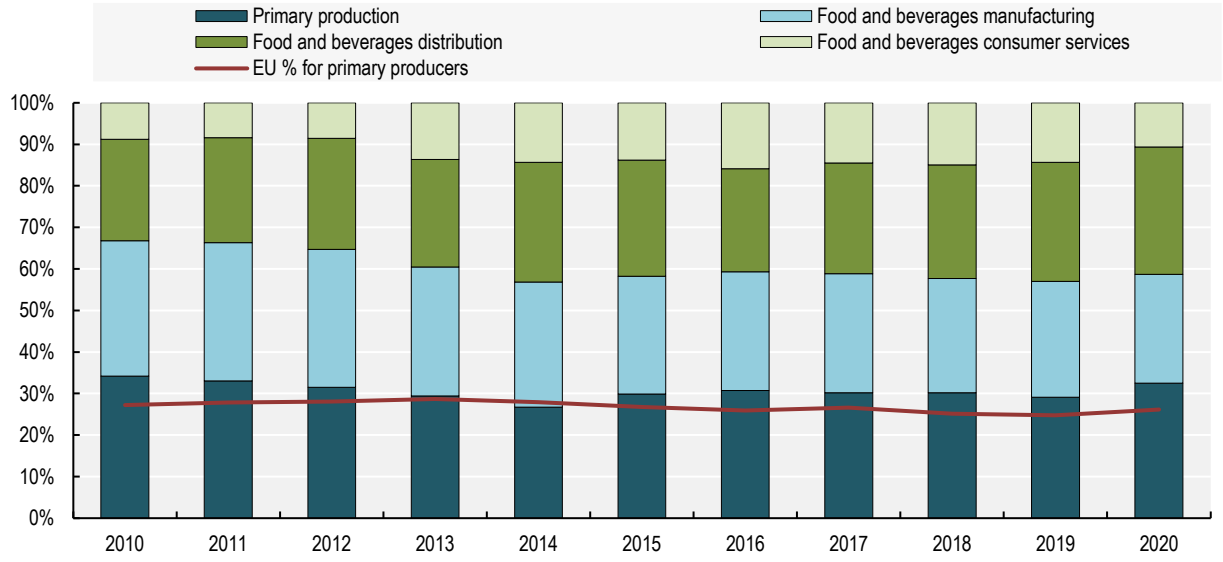
5.1.1. Distribution of value added across the agro-food supply chain

Primary production accounts for the largest share of the food value added in Croatia.

The relative contribution of primary producers to the Croatian food value added has been decreasing over time, but still represents nearly a third of the total food value added (Figure 5.1). The relative share of primary production in the total food value added marginally decreased from 34% in 2010 to 32% in 2020, but remains slightly above the EU average (26%). As discussed in Chapter 1, primary production in Croatia is dominated by low value products and about two-thirds of arable land produces low-value cereals (European Commission, 2020[3]).

Figure 5.1. Primary production contributes one third of food value added

Distribution of food value added in Croatia, 2010-20



Source: European Commission (2023). CAP Result indicator RPI_03 Value for primary producers in the food chain, [https://agridata.ec.europa.eu/extensions/DashboardIndicators/DataExplorer.html?select=EU27_FLAG,1].

The remaining value added was distributed among food and beverages distribution services (31%), food and beverages manufacturing (26%) and consumer services (11%). The segment with the highest growth has been distribution services, which grew from 24% of the total food value added in 2010 to 31% in 2020.

The processing of food and beverages contributes around one-fifth of the total manufacturing value added in Croatia, but its share has been steadily decreasing. The share of food, beverages and tobacco in the total manufacturing value added was 20% in 2020, down from 27% in 2013 (World Bank, n.d.[4]).

5.1.2. Market concentration in processing and retail

Market concentration is low for food products, high for soft drinks, and moderate for grocery retail

Market concentration in the food and beverages processing sector is low for food products. In 2018, the four main players (CR4)[1] in food manufacturing controlled 29% of the market (4 percentage points lower than in 2009). Besides the market leader, there were 12 other companies with a market share of at least 1%, five of which were only present in the Croatian market (Van Dam et al., 2021[5]). Market concentration in soft drinks, however, is high and increasing: in 2018 the CR4 had 63% of the market share, 20 percentage points higher than in 2009. In addition to the leader, there were 12 other companies with at least 1% of market share. Of these 12 companies, four were present exclusively in the Croatian market (Van Dam et al., 2021[5]).

Fortenova Group (formerly Agrokor dd) is the main player across the food supply chain in Croatia. It is a good example of how certain socially-owned enterprises of former Yugoslavia known as *agro-kombinats*,[2] continue to be key players of the food production and processing sector following their privatisation (World Bank, 2016[6]). In 2018, the group had a market share of 10% for food products, 26% for soft drinks, and 19% for grocery retail (Van Dam et al., 2021[5]).

In 2021, consumers predominantly shopped in hypermarkets and supermarkets, which represented more than two-thirds (71%) of the total groceries retail turnover. In 2021, the market concentration for the largest five retailers (CR5) was 66%, while the ten largest players accounted for 83.5% of the market (CR10). According to the Croatian Competition Agency, this structure denotes a moderate market concentration of the grocery retail market (Croatian Competition Agency, 2022[7]). In addition to the market leader, there were nine other companies with more than 1% market share in 2018, six of which were exclusive to the Croatian market (Van Dam et al., 2021[5]).

5.1.3. Co-operation and other interventions to improve farmers' position in the value chain

Participation of farmers in Producer Organisations and other associative forms is low

Producer organisations (POs), associations of producer organisations (APOs) and inter-branch organisations (IBO) are the main associative structures recognised by the European Union regulation concerning the common organisation of agricultural products (CMO Regulation).[3] A PO can be defined as any entity, including co-operatives, that has been formed and is controlled by producers in a specific sector to jointly pursue one or more of the objectives set forth in the CMO Regulation (European Commission, 2018[8]). APOs are associations of POs, while IBOs are groups composed by both farmers and processors and/or traders.

When POs, IBOs and APOs meet certain criteria, they can be recognised by EU Member States, which allows them to receive EU financial support and benefit from certain derogations from competition rules. The regulations of the EU Common Agricultural Policy (CAP) have long provided for derogations from EU competition rules for some sectors (e.g. dairy, pork, sugar, fruit and vegetables, wine) to allow farmers to co-operate through POs, APOs, and IBOs. The Omnibus Regulation (EU) No. 2017/2393 extended to all production sectors the possibility for these groups to collectively negotiate contracts for the supply of agricultural products, including price contracts (OECD, 2023[9]).

The number of recognised POs has increased from 6 in 2016 to 26 in 2024, but their relative importance remains low. These POs have 877 members, which represent around 0.6% of farm holdings, and operate in eight different sectors: fruit and vegetables sector (7), poultry meat (1), milk and dairy products (3), cereals (4), beef and veal (3), wine (2), live trees and other plants (2) and other products (potatoes) (4). When contrasting the number of POs with the total number of agricultural holdings, Croatia has 14.5 POs per 100 000 agriculture holdings, while the EU average in 2020 was 41.[4]

Farmers' participation in co-operatives is similarly limited. In 2019, there were 613 active co-operatives, representing 0.2% of farmers, and only two of them were recognised as POs (Arcadia International E.E.I.G, European Commission and EY, 2019[10]) (European Commission, 2020[3]). Box 5.1 explores historical reasons behind farmers' low engagement with co-operatives.

Box 5.1. Perceptions of socialist-era co-operatives continue to influence farmers today

Co-operatives have existed in Croatia since the late 19th century, playing a key socioeconomic role and holding particular importance in the agriculture sector throughout much of the 20th century. They are, however, of little relevance in today's agro-food sector. While this can result from a variety of factors, historical reasons linked to the socialist era are certainly among them.

During the socialist era, the operation of co-operatives was heavily regulated, with numerous restrictions impeding entrepreneurial initiatives and limiting decision-making freedom. In practice, and despite

market-oriented reforms during the 1980s, co-operatives in Yugoslavia were collective, state-controlled institutions in which private property and the original co-operative values faded.

Following independence, political, social, and economic relations in Croatia changed significantly as it transitioned from a centrally planned to a market economy. While transition could have implied a resurgence of the original co-operative concept, co-operatives remained on the margins of political interests, perceived by many as an ideological, uneconomic creation associated with the former Yugoslavia.

More than three decades after Croatia's independence, many farmers remain reluctant to engage in co-operatives, and the term continues to carry negative connotations for some.

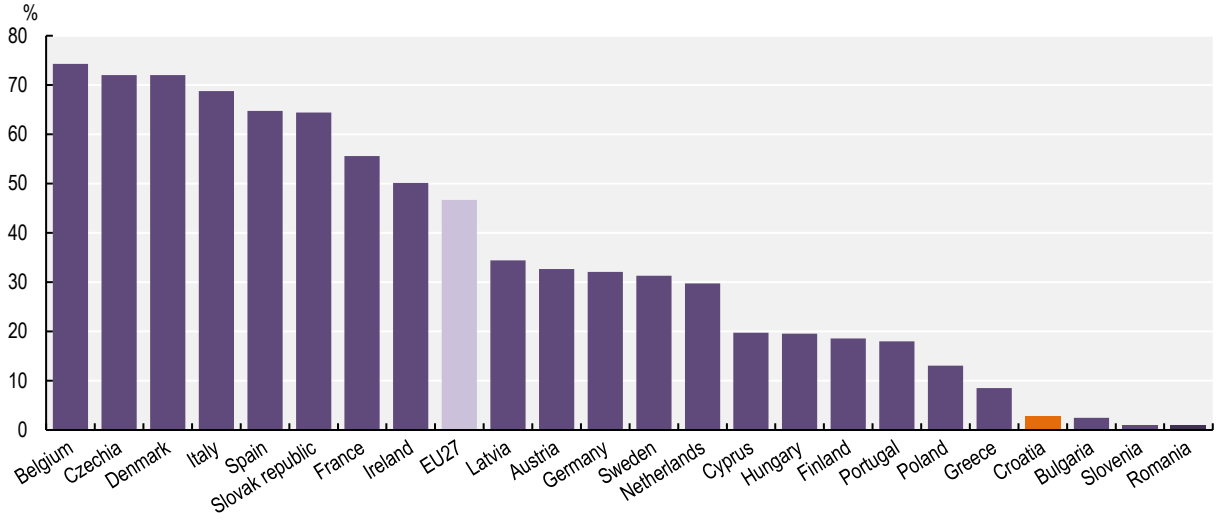
Sources: Božić, Šprajc, Srbljinović (2019[11]), and Kantar (2021[12]).

The contribution of Croatian POs to the economy is very low

Across the European Union, recognised POs play an important role in the fruit and vegetables sector, where 47% of total production was marketed by POs in 2021. In Croatia, the corresponding figure was less than 3% (Figure 5.2). Croatia's CAP Strategic Plan for 2023-27 (CSP) has set the goal of increasing the share of production marketed by POs in total fruit and vegetable production to 7% by 2027 (Ministry of Agriculture, 2022[13]). In the dairy sector, another indicator used at the EU level to measure the importance of POs in primary production is the share of raw milk delivered by POs and APOs in the total production. Recent information for Croatia is not available, but in 2018 (the last year reported) it was close to 0%, while the average in countries reporting information to Eurostat was 25%.[5]

Figure 5.2. Only 3% of Croatia's fruit and vegetables production is sold by producer organisations

Share of production marketed by POs in total fruit and vegetable production, 2021



Note: Data unavailable for Estonia, Lithuania, Luxembourg, and Malta.
Source: European Commission (2023). CAP indicators, Adding Value Indicator OIM_05_1a: % of production marketed by POs and APOs, https://agridata.ec.europa.eu/extensions/DashboardIndicators/DataExplorer.html.

Policy interventions to strengthen the position of farmers in the value chain

For the 2023-27 CAP period, Croatia has budgeted EUR 5.3 million to support the establishment and operation of producer organisations (see also Section 2.3.4) (Ministry of Agriculture, 2022[13]). However, experience shows that interest for some of these measures has been low. For example, in the 2014-20 CAP period, the planned budget for supporting POs was EUR 8 million, then reduced to EUR 5 million; in the end, only EUR 4.2 million were spent.[6]

The Croatian Recovery and Resilience Plan (RRP) (see also Section 2.4.1) includes investments of EUR 800 000 to strengthen the position and recognition of producers in the fruit and vegetable supply chain. This intervention seeks to educate and support members of POs in the field of management and finance and to encourage them to participate in the management and ownership of the logistics and distribution centres developed under the RRP (Section 5.1.4).

Other interventions under the CSP to improve the position of farmers in the value chain include promoting quality schemes, short supply chains, and local markets. The goal for 2023-27 is that 0.89% of all agricultural holdings (1 200 farms) participate in producer groups, producer organisations, local markets, short supply chains and/or quality schemes that have been granted support under the CAP (Ministry of Agriculture, 2022[13]).

Regarding quality schemes, the number of products with a protected designation of origin or a protected geographical indication is growing. To date, Croatia has 47 agro-food products, 18 wines, and 6 spirits registered in the EU database eAmbrosia for protected designations of origin and geographical indications.[7] Despite this, the original allocation of EUR 6 million for supporting quality schemes under the 2014-20 rural development plan was reduced to EUR 2.5 million due to low uptake (European Commission, 2020[3]), and the actual expenditure in 2015-22 amounted to only EUR 1.8 million. For the 2023-27 CSP, EUR 11.8 million has been budgeted (Ministry of Agriculture, 2022[13]).

Various private and public initiatives have been launched to support short supply chains and local markets. They include an e-commerce platform[8] to provide a digital marketplace for Croatian agricultural and food products and a local project (*Međimurski štacun*) based on a partnership model that brings together producers from Međimurje county to sell food products through short supply chains. Furthermore, through rural development measure M16 of the 2014-22 CAP, nine EIP operational groups received support to promote short supply chains and local markets. The 2023-27 CSP has allocated EUR 2.5 million to support short supply chains and local markets (Ministry of Agriculture, 2022[13]).

5.1.4. Logistics and integration into global value chains

Croatia's geography underpins the need for good logistics infrastructure

Croatia's long coastline and high border/area ratio imply that many regions and municipalities are relatively far away from each other. In fact, the four most populated cities after Zagreb are closer to other European capitals than to Zagreb, and two of them closer to non-EU capitals.[9] Furthermore, Croatia's agricultural regions have very different production conditions (Chapter 1).

This particular geographical context underpins the need for good logistics that enable the integration of farmers and other actors in the national, regional, European, and global value chains. While Croatia has historically underperformed in the logistics sector (World Bank, 2016[6]), recent indicators show progress: the World Bank Logistics Performance Index increased from 3.16 to 3.30 between 2016 and 2023, although still below the OECD average of 3.6 (World Bank, 2023[14]). Croatia has also improved in most of the areas covered by the OECD Trade Facilitation Indicators, including on border processes and streamlining of border procedures (Section 2.6.2).

Despite this progress, the government recognises there is a significant lack of cooling capacities and distribution centres, as well as an uneven regional distribution of these facilities (Ministry of Agriculture, 2022[13]). In particular, the lack of adequate post-harvest logistics infrastructure, equipment, and support services for aggregating, processing, distributing and marketing domestic products are seen as a major bottleneck for the development of agro-food value chains (World Bank, 2021[15]).

To address these challenges, the largest share of agriculture-related funds under Croatia's RRP (EUR 81 million) is devoted to constructing and equipping logistic distribution centres for fruit and vegetables, as well as ancillary capacity building measures to encourage POs to own and manage these centres (Government of the Republic of Croatia, 2021[16]). The first Regional Distribution Centre for Fruits and Vegetables was opened in Osijek-Baranja county in early 2023 and another was under construction at the time of drafting this report (Section 2.4.1).

An interesting example of private sector led development of cooling and storage infrastructure is seen in the dairy sector, where the structure of milk storage and collection is generally well organised. This was possible in part thanks to investment support by milk processors to cooling facilities on the farms of mostly larger livestock operations (World Bank, 2021[15]). Recent efforts have improved access to cold-chain logistic infrastructure for small producers and processors. These include a support program for the reconstruction of milk collection points in 2021 and 2022 and programmes to co-finance milk collection costs for small dairy businesses.

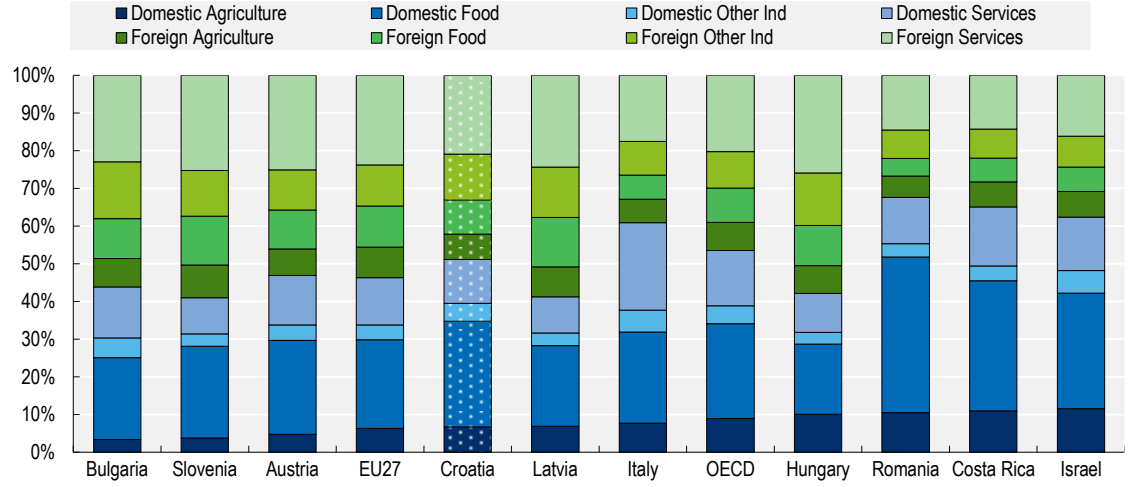
The agro-food sector in Croatia is well integrated into GVCs

As shown in Chapter 1, the food industry in Croatia is better integrated into global value chains (GVCs) than is primary agriculture. The indicators of forward and backward participation in GVCs have increased since 2000, as has the content of foreign services value-added in food exports.

Forty-nine per cent of the value added in Croatia's domestic demand for food, beverages and tobacco comes from foreign sources. This is similar to the shares recorded in peer countries, slightly below the EU average and above the OECD average. Services were the most important foreign source industry, accounting for 21% of the value added in the food sector's final demand.

Figure 5.3. Foreign industries account for half of the value added in the food domestic demand

Origin of value added in the domestic demand for food, beverages, and tobacco, 2020



Notes
1. The values for EU and OECD are simple averages of the values of their Members.
2. Countries are sorted according to Domestic Agricultural value in 2020
Source: OECD (2023), Trade in Value Added (TiVA) [database], oe.cd/tiva (consulted in December 2023).

5.1.5. Responsible Agriculture Supply Chains

Croatia has adhered to the Recommendation of the Council on the OECD-FAO Guidance for Responsible Agricultural Supply Chains

Responsible business conduct (RBC) is not a new concept in Croatia. The opening of the economy and Croatia's accession to the European Union reinforced the legal framework that underpins RBC (OECD, 2019[17]). More recently, Croatia adhered to the Council Recommendation on the OECD Due Diligence Guidelines for RBC (Guidelines) and established its National Contact Point. Croatia also adhered to various other RBC-related OECD legal instruments, including the Recommendation of the Council on the OECD-FAO Guidance for Responsible Agricultural Supply Chains (OECD-FAO Guidance).[10] Croatia has also transposed EU regulation on unfair trading practices in the agro-food supply chain (Section 5.2.2).

Croatia's efforts to support the implementation of the OECD-FAO Guidance Recommendation have focused on awareness raising and promotional activities, including the preparation of a promotional leaflet in Croatian.[11] Beyond promotional activities, adherents to the OECD-FAO Guidance Recommendation have taken additional types of measures to encourage the use of this guidance. For instance, some have referenced the OECD-FAO Guidance in domestic regulation, incentivised its use by company management systems or conditioned public procurement on demonstrated implementation of the OECD-FAO Guidance (OECD, 2022[18]). Croatia could improve its overarching enabling environment for RBC by following the recommendations of the OECD Working Party on Responsible Business Conduct (WPRBC).

5.2. General landscape of food system policies, including market regulations

5.2.1. Addressing the triple challenge of food systems involves policies in multiple domains

Food systems around the world are expected to deliver on a formidable "triple challenge". The first challenge is to ensure food security and nutrition for all. The second is to provide livelihoods to farmers and others in the food chain and promote rural development. The third is to do all this while ensuring environmental sustainability – i.e. using natural resources sustainably (including protecting valuable ecosystems and biodiversity) and reducing greenhouse gas emissions, as well as meeting other societal expectations such as animal welfare (OECD, 2021[1]).

Croatia does not have a food systems law or integrated policy framework that simultaneously looks at these three challenges. Agricultural policy follows the CAP objectives and the strategic vision for the sector is mainly contained in the CSP and the National Agricultural Strategy until 2030 (Section 2.1.4). Additionally, multiple other food systems-related policies co-exist and fall under the responsibility of authorities scattered across jurisdictions, government agencies, and levels of government. This is not uncommon across countries, given the complexity of food systems (OECD, 2021[1]).

While an exhaustive overview of all food system-related policies would exceed the scope of this accession review, this section will briefly look at specific topics related to each of the three challenges faced by food systems:

- *for food security and nutrition*, emphasis will be given to the existence of school meals programmes and food banks, which are two types of food assistance programmes of importance in OECD countries (Giner and Placzek, 2022[19]).
- *for improved livelihoods of farmers and others*, emphasis will be given to market regulation and competition issues.
- *for environmental sustainability*, emphasis will be given to food waste, a topic of growing interest for OECD Members.[12]

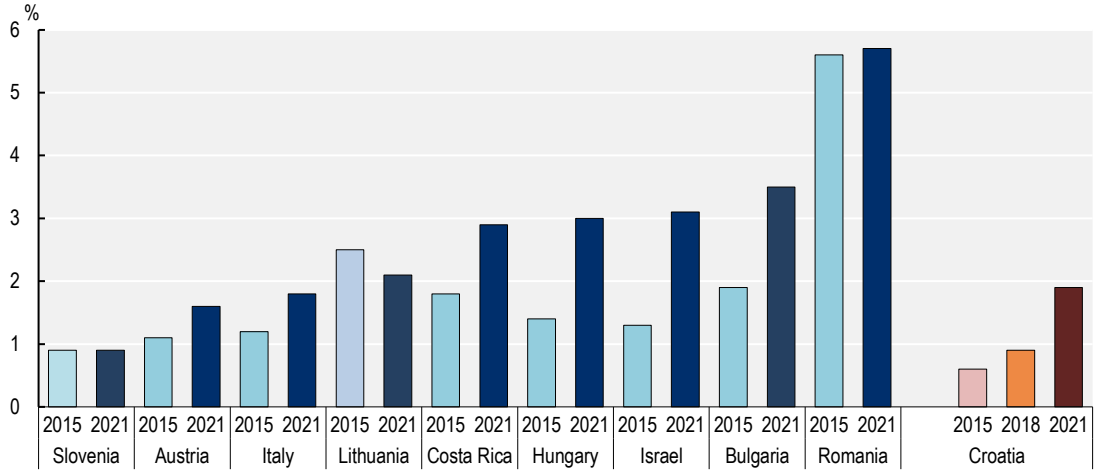
5.2.2. Food assistance programmes

Food insecurity in Croatia is relatively low, but increased following the COVID-19 pandemic

While the prevalence of severe food insecurity in Croatia had consistently been below 1% during the last decade, it increased to nearly 2% during the 2019-21 period (Figure 5.4).[13] This trend was seen in other OECD and EU countries following the COVID-19 pandemic.

Figure 5.4. Prevalence of severe food insecurity increased following the COVID-19 pandemic

Prevalence of severe food insecurity in the population



Note: Percentage of the population who live in households classified as severely food insecure. A household is classified as severely food insecure when at least one adult in the household has reported to have been exposed, at times during the year, to several of the most severe experiences described in the Food Insecurity Experience Scale (FIES) questions, such as to have been forced to reduce the quantity of the food, to have skipped meals, having gone hungry, or having to go for a whole day without eating because of a lack of money or other resources.
Source: World Bank (2023). World Development Indicators. Accessed November 2023

This section focuses on two food assistance programmes applied by Croatia: the school meals programme and food banks. Governments use other policy tools to improve access to food for households in situations of vulnerability and thereby food security, including food vouchers, which are used by some OECD countries. Policy responses to food insecurity can also focus on more general livelihood assistance programmes such as increasing universal social security payments or providing cash transfers or universal basic income (Giner and Placzek, 2022[19]). When both types of policy responses exist, as is the case of Croatia, policymakers should work on identifying potential synergies and trade-offs.

An EU-funded programme supports the distribution of food in schools

Croatia has a school meals programme in force which in the 2020-21 school year delivered food to 405 000 children in public and private schools,[14] and covered 66% of primary and secondary school-age children. According to the 2017-23 National Strategy for the Implementation of the School Scheme, the main objectives are increasing the proportion of fruit and vegetables, milk and milk products consumed by children and promoting healthy eating habits (Global Child Nutrition Foundation (GCNF), 2021[20]). The programme also aims to raise students' knowledge about the importance of healthy nutrition, and to educate students to reduce food waste.[15]

The school meals programme in Croatia benefits from resources of the EU school scheme,[16] which supports the distribution of fruit, vegetables and milk to schoolchildren ranging from nursery to secondary

school, and includes educational measures that seek to increase the consumption of these products and contribute to shaping healthier diets (European Commission, 2022[21]). The accompanying educational activities include the creation and maintenance of school gardens, visits to farms, and lectures. In the school year 2021-22, a total of HRK 14.9 million (almost EUR 2 million) was paid for all of the programme's activities (Ministry of Agriculture, 2023[22]).

According to a 2021 survey, recent successes in Croatia include the expansion of programme coverage to almost all children and its adaptability to children's needs and preferences (Global Child Nutrition Foundation (GCNF), 2021[20]). Furthermore, since early 2023, all primary school students have access to at least one free meal per school day (Government of the Republic of Croatia, 2022[23]).

Croatia is promoting the establishment of food banks to facilitate food donations

Food banks are not-for-profit organisations that collect and distribute food to people struggling with food insecurity. While they were initially developed as an emergency tool for a hungry population, they continue to play a major role for food insecure households in many OECD countries and across the world (Giner and Placzek, 2022[19]). In Europe, over 350 food banks from 30 countries are brought together under the umbrella of the European Food Banks Federation (FEBA).

In Croatia, the food donation system has traditionally relied on intermediaries (usually non-governmental organisations - NGOs), which are often overburdened by activities related to reception, transport, and storage. In order to address this, and as part of broader efforts to increase food donations under the 2019-22 National Plan for Food Waste Prevention, a feasibility study for the establishment of a food bank in Croatia was published in 2020. The study concludes that possible models for establishing a food bank system in Croatia are an umbrella organisation, a model of regional co-ordinators (similar to what is currently in place), or a model of county co-ordinators (Government of the Republic of Croatia, 2022[24]).

The Croatian Government has opted for co-ordination at the county-level and it is expected that around 20 county-level food banks will be operating in 2024 (Government of the Republic of Croatia, 2022[23]). County co-ordinators are in charge of receiving food donations, and distribute them to beneficiaries either directly or through other intermediaries in the food donation chain. This measure is expected to facilitate food donation and lighten the administrative burden for intermediaries (Government of the Republic of Croatia, 2022[23]).

Promoting food donations and food banks can reduce waste

Food donations can be made directly to the final recipient or through intermediaries (such as NGOs) registered at the Ministry of Agriculture. In 2018, the Ministry established an electronic channel (e-donation) for improving interconnections and communication between donors and intermediaries. All food can be donated under the condition that it is safe for consumption (Government of the Republic of Croatia, 2019[25]). The amount of food donated in 2021 was 1 600 tonnes which represents an increase of 6% compared to 2019 (Government of the Republic of Croatia, 2022[24]). Quantities of donated food have been on the rise since 2016 (when monitoring began), and an incentive is provided through a tax relief for food donations (European Commission, 2020[3]).

The Recovery and Resilience Plan contains two specific measures aimed at reducing food waste and increasing food donations. The first one refers to the establishment of an online platform to disseminate best practices, raise awareness and educate about food waste and food donation. The platform was upgraded in 2022 with additional functionalities, especially related to the adaptation of the existing system for regional management (Section 2.4.1). The second measure consists of a support scheme for equipping food banks and intermediaries in the donation chain with infrastructure such as cooling and storage facilities and equipment (Government of the Republic of Croatia, 2021[16]). Specifically under this second

measure (C1.5 R.4), nine projects have been undertaken to finance infrastructure equipment for food banks and other intermediaries in the food donation chain.

5.2.3. Market regulation and competition issues

Market regulation and competition in the sector are in line with EU regulation

As explained in Chapter 2, upon accession to the European Union Croatia became part of the EU single market and measures related to the trade of agro-food products, such as tariffs and tariff rate quotas (TRQs), are defined and co-ordinated at the EU level. Croatia also transposed into national law the EU legislation related to Sanitary and Phytosanitary (SPS) measures and technical barriers to trade (TBT).

Croatia is subject to the common organisation of agricultural products contained in Regulation (EU) No. 1308/2013 and Regulation (EU) No. 2021/2017, which regulate the use of market-support tools, exceptional measures, and aid schemes for certain sectors (Publications Office of the European Union, 2021[26]). The CAP includes several measures that can be activated in case of market and economic crises, notably the traditional instruments of public intervention and support for private storage, which were augmented by provisions for exceptional measures for all products in the event of a market disturbance in Articles 219-222 of Regulation (EU) No. 1308/2013 (OECD, 2023[9]). These articles provide considerable discretion to the European Commission to handle market crises, including the use of voluntary supply controls and financial support packages. In addition, Member States are authorised to provide national assistance to their farmers under state aid rules, an option often used in response to the COVID-19 pandemic and the energy price hike induced by the war in Ukraine (OECD, 2023[9]). Croatia does not have any additional regulation on market organisation measures outside the EU legal framework.

As regards competition in the agro-food sector, the Act on the Prohibition of Unfair Trade Practices in the Food Supply Chain has been in force since 2017. The Act is harmonised with the EU Directive on unfair trading practices in business-to-business relationships in the agricultural and food supply chain (2019/633), and the entity in charge of its implementation is the Croatian Competition Agency.

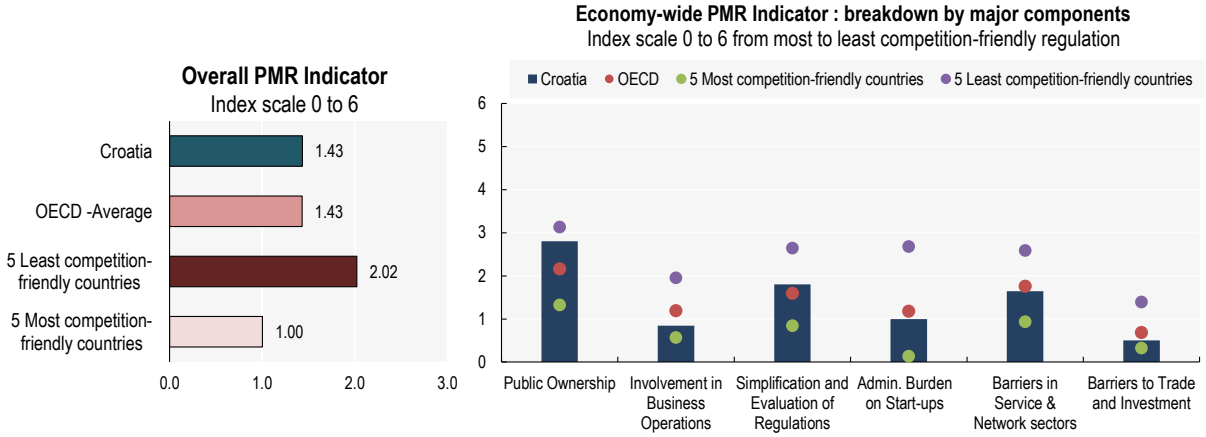
EU Directive 2019/633 distinguishes between practices that are always prohibited (often referred to as “black” unfair trading practices), and practices which are only allowed if the supplier and the buyer agree to them beforehand in a clear and unambiguous manner (“grey” practices). Black unfair trading practices include short notice cancellations of perishable agri-food products, unilateral contract changes by the buyer, risk of loss and deterioration transferred to the supplier, or the misuse of trade secrets by the buyer. Grey practices include the return of unsold products; payment of the supplier for stocking, display, and listing; payment of the supplier for promotion, marketing, and advertising.

Product market regulation in Croatia is as competition-friendly as the OECD average

Several reforms in recent years have made Croatia’s regulatory framework more competition-friendly (OECD, 2023[27]). According to the OECD Product Market Regulation Indicators (PMR),[17] product market regulation in Croatia is as competition-friendly as in most OECD Member countries (OECD, 2018[28]). While this is an economy-wide indicator, it highlights where Croatia’s regulatory framework stands vis-à-vis OECD Members in several areas which can affect businesses, including those along the food supply chain. For instance, Croatia scores worse (1.80) than the OECD average (1.59)[18] on “Simplification and Evaluation of Regulations” due mostly to the lack of rules regulating the interaction between policymakers and interest groups. However, Croatia’s score regarding regulatory restrictions to trade and investment is low (on average 0.51), indicating a better performance than the OECD average of 0.69 (Figure 5.5).

Figure 5.5. Croatia's regulations are as pro-competition as the OECD average

Benchmarking of Croatia's performance in the economy-wide PMR Indicator, 2018

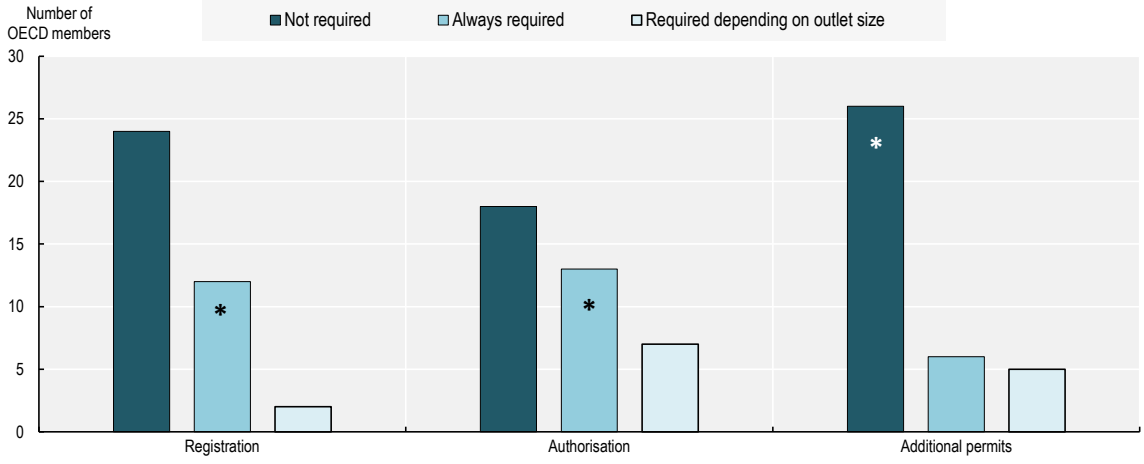


Note: The PMR values range between (0) and (6) from the most to the least competition friendly regulatory regime. Lower scores indicate a better performance.
Source: OECD (2018), PMR database. Consulted December 2023.

While the PMR sectoral indicators do not cover the agro-food sector, they do cover retail, including specific information on food and beverages retail outlets. According to this, Croatia is slightly less competition-friendly than the OECD average, as a registration in a specific register (beyond a general commercial or trade registry) and an authorisation are both required to establish a new retail outlet selling food and beverages (Figure 5.6).

Figure 5.6. Both an authorisation and a registration are needed to establish new food and drinks retail outlets in Croatia

Conditions to establish a new retail outlet selling food and beverages in Croatia vs. OECD Members



Note: The asterisk (*) indicates Croatia's answers.
Source: OECD (2018), PMR database. Consulted December 2023.

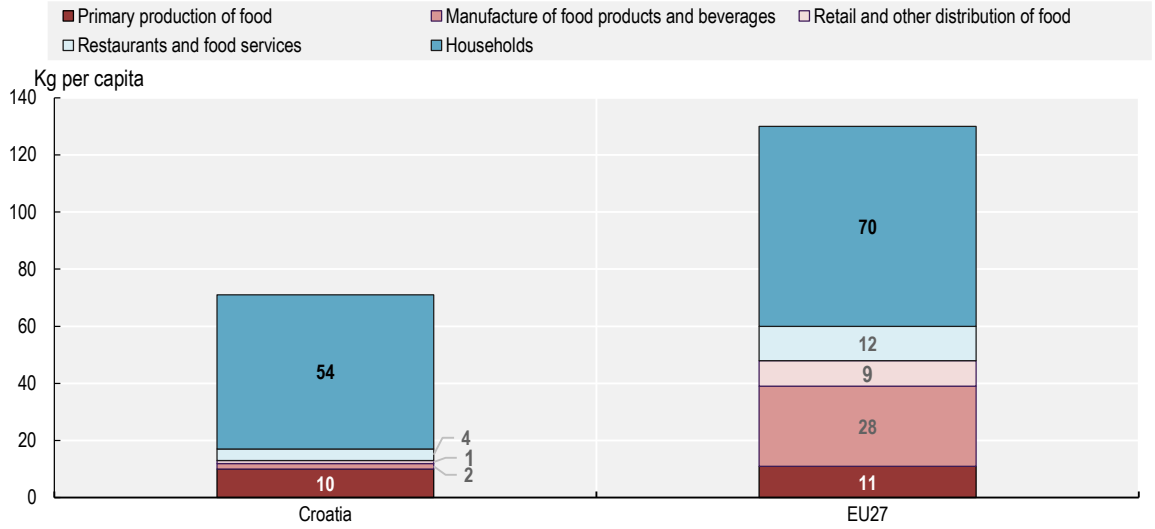
5.2.4. Food waste

Per capita food waste levels are relatively low in Croatia

In 2021, Croatia produced very low levels of food waste per inhabitant (71 kg) compared to the EU average (130 kg) (Figure 5.7). Households accounted for three-quarters (76%) of the total amount, followed by primary production (14%) and food services (6%). The share of food and beverages processing (3%) and food retail (1%) in total food waste seems extremely low when compared to the EU average, which is seven times higher for both sectors (21% and 7% respectively).

Figure 5.7. Croatia generates 59 kilograms less food waste per inhabitant than the EU average

Food waste generated by the main economic sectors in Croatia and the European Union, 2021



Note: Economic activity according to NACE rev.2. Food waste consists of parts of food intended to be ingested (edible food) and parts of food not intended to be ingested (inedible food). Food waste is any food that has become waste under these conditions: it has entered the food supply chain, it has then been removed or discarded from the food supply chain or at the final consumption stage, and it is finally destined to be processed as waste.
Source: Eurostat (2023[29]), Environment and energy indicators/Waste stream [env_wasfw]. Accessed October 2023.

Given changes in the methodologies used to measure food waste it is difficult to evaluate Croatia's progress over time. A rough estimate from the Waste Management Information System for 2017 indicated an amount of 97 kg/inhabitant (Croatian Agency for the Environment and Nature, 2018[30]). Those estimates, however, were not in line with the methodologies for the measurement of food waste adopted at EU level in 2019.[19] In order to fulfil the obligations prescribed by EU Waste Framework Directive, comprehensive statistical research was conducted with 2020 as reference year. This was part of the measures to improve measurement and monitoring under the 2019-22 National Plan for Food Waste Prevention. Food waste values for 2020 and 2021 are nearly identical (Eurostat, 2023[29]). As research under the prescribed methodology started only recently, the collected data continues to have limitations.

In December 2022, Croatia adopted a new National Plan for the Prevention and Reduction of Food Waste for 2023-28. The plan builds on an assessment of the implementation of the 2019-22 National Plan for Food Waste Prevention. It aims at reducing food waste by 30% by 2028. The most important measure of this plan is to encourage food donations, including by establishing food banks to improve the donation system (Section 5.2.2). Other measures include consumer education and information campaigns, promoting voluntary agreements with the private sector to implement good practices, and investing in

research work and innovative solutions to prevent and reduce food waste. An estimated EUR 5.7 million are necessary to implement the Plan's measures, with EUR 4 million coming from EU funds and the remainder from the national budget (Government of the Republic of Croatia, 2022[24]).

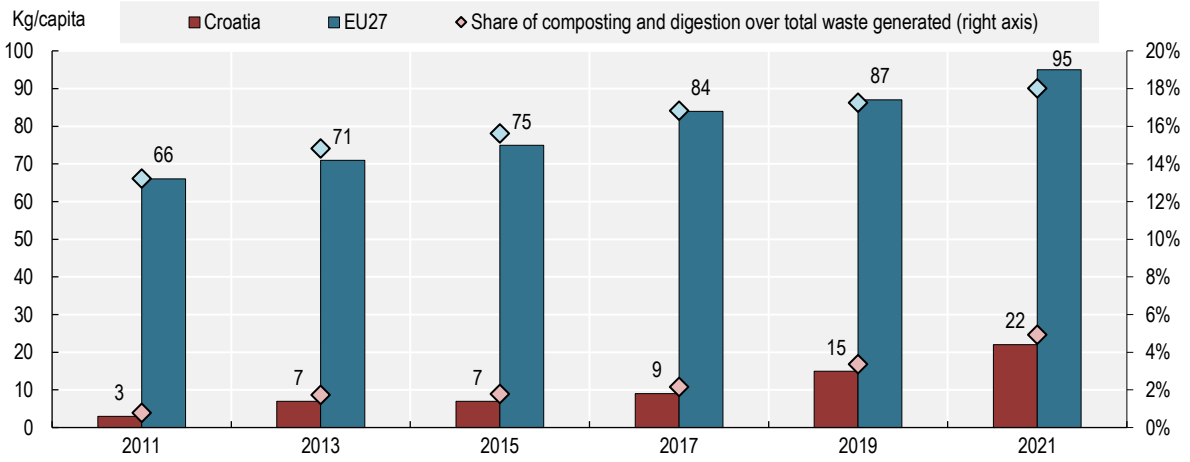
Croatia's capacity to treat food waste has improved but remains far from the EU average

According to the EU hierarchy for prioritisation of food surplus, by-products, and food waste prevention strategies, recycling nutrients is the preferred strategy when prevention, re-use or recycling of food waste is not possible (European Commission, 2020[31]). Recycling of nutrients is usually done through composting or anaerobic digestion, the two most common treatment methods for bio-waste treatment (European Environment Agency, 2020[32]). In Croatia, the use of composting and anaerobic digestion has steadily increased since 2010, but the 22 kg per inhabitant reached in 2021 is still far below the EU average of 95 kg. Moreover, only 5% of all municipal waste generated in Croatia was composted or digested, against 18% at the EU level (Figure 5.8).

While the data for composting and digestion included in Figure 5.8 refers only to municipal waste and does not cover food waste from the food manufacturing sector and agricultural food waste, it is still a useful proxy of a country's capacity to treat food waste. Bio-waste is the largest component of all municipal waste in Europe (34%) and about 60% of this municipal bio-waste is food waste (European Environment Agency, 2020[32]). Additionally, since households produce 76% of food waste in Croatia (against the EU average of 53%), data on municipal waste is more illustrative for these purposes, compared to other countries.

Figure 5.8. Croatia's capacity to treat food waste has improved, but remains relatively low

Evolution of composting and digestion in Croatia and the European Union, 2011-21



Source: Eurostat (2023), Environment and energy indicators/Waste [env_wasmun]. Accessed October 2023

Increasing the levels of composting and digestion requires that bio-waste has a separate collection system (European Environment Agency, 2020[32]). In 2017, Croatia separately collected only 3% of its estimated potential total bio-waste, which is low compared to the EU average of 32%. This percentage decreases to just 2% for food waste,[20] also below the EU average of 16% (European Compost Network, 2022[33]). Furthermore, and despite heavy investment in the waste collection infrastructure, in 2021 Croatia separately collected only 25% of its municipal bio-waste, far from the 2022 target of 40% defined in its National Waste Management Plan (NWMP) (Ministry of Economy and Sustainable Development, 2022[34]). EU Member States were required to ensure separate collection of bio-waste by the end of 2023.[21]

This limited waste treatment capacity is not exclusive to bio-waste. Croatia treats less municipal waste per capita than most OECD Members and the contribution of waste to overall GHG emissions (8%) is much higher than the OECD average (3%) (OECD, 2023[27]). The Recovery and Resilience Plan includes measures for the overall improvement of water and waste management with a budget of EUR 860 million (1.4% of the 2022 GDP including investments for recycling facilities and waste sorting centres, which can help address current limited capacities). The plan includes reforms to promote recycling and reduce landfilling by increasing the responsibilities of producers for waste management and promoting pay-as-you-throw schemes (Government of the Republic of Croatia, 2021[16]) (OECD, 2023[27]).

When reviewing Croatia's 2023 National Reform Programme, the European Commission encouraged Croatia to increase investment in the composting and digestion infrastructure to improve the country's strategic autonomy by generating bio-methane and/or producing organic fertilisers (European Commission, 2023[35]).

5.3. Demand side policies for healthy diet and consumption choices and sustainability of food systems

5.3.1. Selected dietary risks

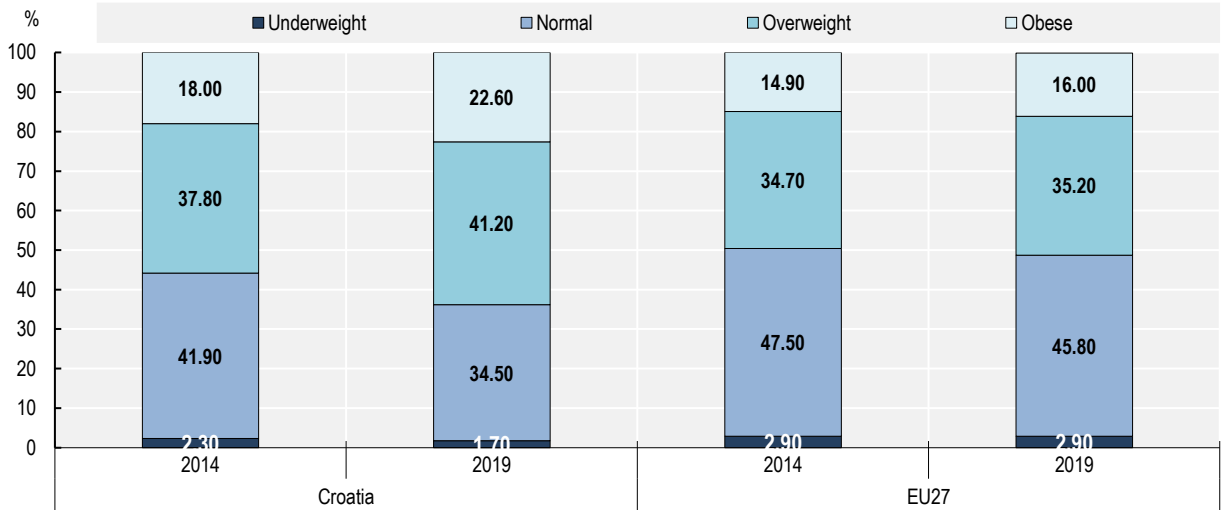
Overweight in Croatia is higher than the EU average and increasing

Overweight and obesity are major risk factors for cardiovascular diseases, diabetes, and certain cancers (OECD/European Union, 2022[36]). Both conditions are leading behavioural factors increasing the risk of disability and cause more than 1.2 million deaths across Europe annually (World Health Organization, 2022[37]).

While projections foresee that obesity rates in OECD Member countries will steadily increase to at least 2030 (OECD, 2017[38]) and the overweight rate increased in almost all EU countries between 2014 and 2019, the situation in Croatia deteriorated much faster than the EU average. The share of the population with overweight (including obesity) increased from 56% in 2014 (50% in the EU27) to 64% in 2019 (52% in the EU27) (Figure 5.9). In the case of teenagers, the overweight rate rose from 18% in 2018 to 24% in 2022, above the EU average (21%) (OECD/European Observatory on Health Systems and Policies, 2023[39]). Among school-aged children, the rates of overweight and obesity were 35% and 15% respectively, also higher than the European averages (World Health Organization, 2022[37]).

Figure 5.9. Overweight in Croatia is higher than in the European Union

Evolution of body mass index, share of the population



Note: Underweight: BMI less than 18.5. Normal weight: BMI between 18.5 and less than 25. Pre-obese (overweight): BMI between 25 and less than 30. Obese: BMI equal or greater than 30.
Source: Eurostat (2023), Population and social conditions indicators [hlth_ehis_bm1e]. Accessed October 2023.

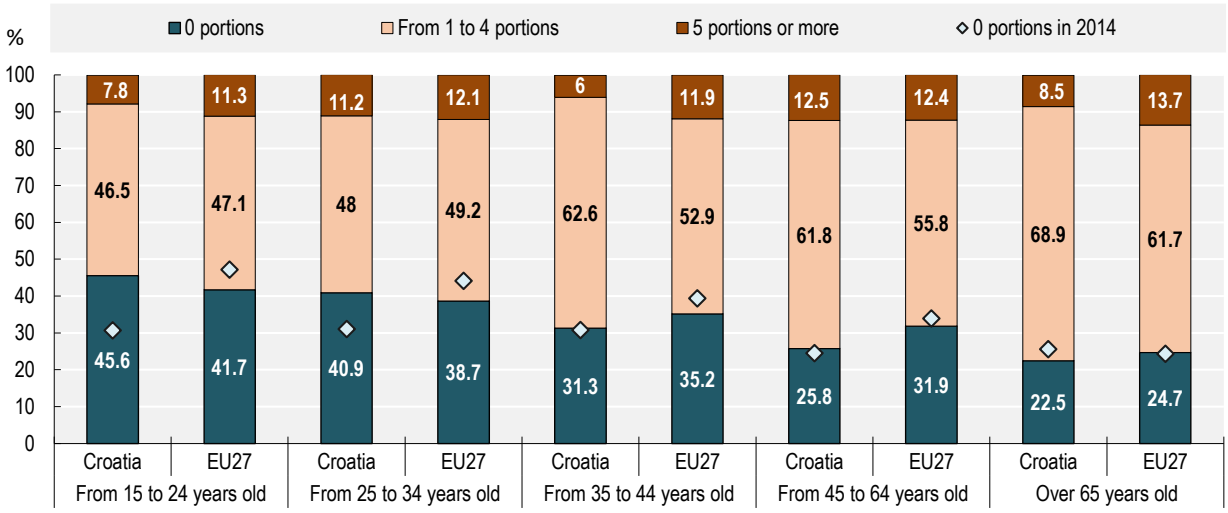
Consumption of fruits and vegetables is particularly low amongst young adults

More than one-fifth (22%) of all deaths in Croatia can be attributed to dietary risks, a share well above the EU average of 17% (OECD/European Observatory on Health Systems and Policies, 2023[39]). These dietary risks include high sugar and salt intake, as well as low fruit and vegetable consumption.

Most adults in Croatia (71%) consumed at least one daily portion of fruits and vegetables in 2019, slightly above the EU average (67%) (Eurostat, 2023[40]). The share of young adults (aged 15 to 34) consuming no fruits and vegetables (zero portions) daily, however, is higher than in the European Union (Figure 5.10). Another recent trend of concern is that the share of 15 to 24-year-olds consuming zero portions grew from 31% in 2014 to 46% in 2019. This goes against the trend observed for the rest of the Croatian adult population, but also against the EU-wide evolution, where the 15 to 24-year-old population shows better progress than all other age groups (Eurostat, 2023[40]).

Figure 5.10. Fruit and vegetable consumption amongst young adults was relatively low in 2019

Daily consumption of fruit and vegetables by age range



Source: Eurostat (2023), Daily consumption of fruit and vegetables by sex, age and educational attainment level [hlth_ehis_fv3e], DOI: 10.2908/hlth_ehis_fv3e. Accessed October 2023.

5.3.2. Policies to encourage healthier and sustainable food choices

OECD Members use a wide range of policy interventions to incorporate public health considerations into food sector policies. OECD analysis of policies that encourage healthier food choices (Giner and Brooks, 2019[41]) suggests a four-track policy approach to reconcile food security and nutrition objectives with wider food systems objectives (Box 5.2).

Box 5.2. The OECD four-track policy approach to encourage healthier food choices

The large and growing burden that unhealthy consumption habits impose on public health underpins the legitimacy of government intervention. Accordingly, governments have resorted to a wide range of health-related policies, from nutritional guidelines to fiscal policy, to address obesity and other major dietary risks. As in other policy areas, there is no "silver bullet" and the right set of instruments is to be carefully chosen by policymakers, considering the specific characteristics of their respective food systems.

Recognising the diversity of policy responses, the potential synergies among them and the need to find the right policy combination for each context, previous OECD work has proposed a "four-track policy approach" to encourage healthier food choices. This four-track approach can also be easily adapted to encourage more sustainable choices.

The four tracks proposed under this approach are:[1]

1. *Demand-side public interventions* (e.g. education programmes or providing dietary information).
2. *Voluntary collaborations* with the food industry at the supply-demand interface (e.g. food reformulation, food labelling).
3. *Firmer regulations* when public-private incentives are misaligned (e.g. rules on advertising aimed at children).

4. *Fiscal measures* to make the price of certain processed food products more closely reflect their social cost (e.g. excise or sales taxes).

1. The four-track approach was developed by Giner and Brooks (2019[41]), while some of the examples were taken from subsequent OECD work (OECD, 2021[1]).

Croatia has implemented diverse policy actions related to nutrition and diet

Food-based dietary guidelines were published in Croatia in 2002, with further guidelines for 7-10 and 11–15-year-olds published in 2008 and 2012, respectively. These guidelines are useful tools to translate nutrient recommendations into easy-to-understand messages for the general public (Breda et al., 2020[42]) and are a common first-track demand-side public intervention in OECD and EU countries. The school meals programme described in Section 5.2.2 contains multiple first-track interventions to encourage healthier diets among pre-school, primary and secondary school-aged children.

While some policies clearly fit into one of these tracks, there are many policies with measures that fit into multiple tracks. This is the case of Croatia's National Health Promotion Programme "Healthy Living", adopted in 2015 (Table 5.1). Policies intended to promote healthier diets can also address environmental sustainability concerns and vice versa. This is the case of the 2023-2028 Plan for Food Waste Prevention and Reduction, which is intended for sustainability objectives but also has an impact on diets. Table 5.1 synthesises some of the elements of these policies and their categorisation under the four-track policy approach.

Table 5.1. Programmes that include both track 1 and 2 interventions

	Healthy Living Programme	National Programme to Prevent and Reduce Food Waste
Main policy objective	Healthier diets (food security and nutrition)	Reducing food waste (environmental sustainability)
1st track (Demand side public interventions)	• Education measures promoting healthy nutrition. • Online advice on healthy nutrition. • Dietary guidelines for children. • Nutritional recommendations for autumn-winter and spring-summer seasons.	• Awareness and information campaigns to inform consumers. • Inclusion of food waste prevention in the educational program of school meals programme. • Sectorial guidelines for actors across the food supply chain.
2nd track (voluntary collaborations)	• "Healthy Living" front-of-pack nutritional label. • "Healthy company" status for companies that promote health in the workplace.	• Voluntary agreement with actors across the food chain, NGOs, and local and regional public entities to prevent food waste. • Simplification of food donation.

Source: Stimac et al. (2016[43]), European Commission (n.d.[44]).

A key element of Croatia's Healthy Living Programme is a voluntary front-of-pack nutritional label (Table 5.1).[22] Box 5.3 describes several of the main features of the Healthy Living label. While some Member States are trying to have their simplified labelling schemes adopted as the mandatory scheme at the EU level,[23] Croatia has made no efforts in this regard, perhaps due to the fact that the Healthy Living label goes beyond food composition (e.g. the logo can be seen in parks and walking trails) and is perceived as a more general kind of information.

Examples of Croatia's policies under the third track (firmer regulations) include mandatory limits for salt in certain cereal products, as well as restrictions on food advertising in primary and secondary schools. As to fourth-track policy interventions, in April 2020 Croatia established a special tax on coffee and non-alcoholic beverages containing high levels of sugar (World Cancer Research Fund International, n.d.[45]).[24]

Box 5.3. "Healthy living", Croatia's simplified nutritional labelling scheme

As part of its Healthy Living health promotion programme, the Croatian government introduced a front-of-pack nutritional label with the same name. Nutrient criteria for the "Healthy Living" label are based on the recommended daily intake of energy and selected nutrients (total fat, saturated fatty acids, carbohydrates, sugars, proteins, salt) per adult according to the relevant EU regulations.[1]

Examples of simplified front-of-pack nutritional labelling schemes implemented in OECD countries show a high degree of diversity across various dimensions. The table below looks at some of the elements of the Healthy Living label and compares them with experiences in other OECD and accession countries.

	Healthy Living	In other OECD and accession countries
Implementation method	Voluntary[2]	Voluntary (e.g. Korea, EU Member States) Mixed (e.g. Israel) Mandatory (e.g. Canada, Chile, Colombia, Brazil, Finland)
Information conveyed	Positive nutritional composition (logo can be awarded to products meeting common and product-specific criteria defined by group of experts)	Positive nutritional composition (Denmark, Iceland) Negative nutritional composition (e.g. Canada, Chile, Colombia, Finland) Hybrid -positive and/or negative – nutritional composition (e.g. Israel) Nutrient-specific nutritional information (e.g. Italy, Korea, United Kingdom) Summary rating based on an evaluation (e.g. Australia, France, New Zealand)
Scheme		        

1. EU Directive on the provision of food information to consumers No. 1169 /2011, Annex XIII, Part B, Regulations on the provision of food information to consumers (OG 8/2013). 2. As per Regulation (EU) No 1169/2011, EU Member States can only implement simplified nutrition labelling on a voluntary basis, which makes them second-track interventions under the four-track policy approach.
Sources: Giner, Rodriguez and Elasri (2023[46]), and World Cancer Research Fund International (n.d.[45]).

Croatia could explore further policy actions to encourage healthier food choices

Despite having implemented nutrition and diet-related policy actions across different areas, the evolution of dietary risks, obesity rates and fruit and vegetables consumption in Croatia are cause for concern. The country could explore further action in areas such as public awareness, nutritional education and skills, and children-focused measures. It could also consider setting incentives and rules to create a healthier retail and food service environment. Table 5.2 shows relevant examples of policy measures in these areas across OECD and accession countries.

Table 5.2. Areas where further policy action in Croatia could be explored

Measures related to	Examples in other OECD and accession countries:
Food and drink availability in immediate vicinity of schools	**Korea**: The sale of energy dense and nutrition poor foods is prohibited in "Green Food Zones" which cover school premises and stores within 200 metres of schools. Green Food Zones cover over 90% of all schools in the country. **Romania**: Mandatory standards exist for food available in schools or vicinity (500 metres).
Incentives and rules to create a healthy retail and food service environment	**Mexico** (local): The "Less Salt, More Health" is a voluntary agreement between Mexico City and the restaurant industry, whereby restaurants commit to only provide saltshakers to customers upon request. **United States**: The Healthy Food Financing Initiative provides financial and other assistance to attract healthier retail outlets to under-served areas. **United Kingdom (Scotland):** The Scottish National Planning Framework 4 incorporates public health considerations on spatial planning, specifically related to hot food providers.
Nutrition advice and counselling in school healthcare settings.	**Norway**: School health services offer education to increase students' knowledge on the importance of healthy living habits.
Nutrition education and skills (besides including nutrition education in curricula).	**Netherlands**: The Healthy Childcare Programme includes a "train-the-trainer" course on healthy lifestyle (including healthy nutrition) for teachers and childminders who work with children aged 0-12.
Promotion of studies to enhance the evidence base for overweight prevention interventions	**Australia:** Between 2012-18 Australia established the Assessing Cost-Effectiveness (ACE) Obesity Policy, a priority-setting study led by academics and obesity experts to evaluate the "economic credentials" of several obesity prevention policies.
Provision of sugar-sweetened beverages in schools	**Finland**: No energy drinks, soft drinks or any other acidified beverages or beverages with added sugar are served at school. **Mexico**: Mandatory food and beverage guidelines for elementary schools include a ban on sodas; and limitations for the availability of other soft drinks.
Public awareness, education, and skills	**United States** (local): A multi-channel media campaign (#LiveSugarFreed) was deployed in rural areas of Tennessee, Virginia, and Kentucky, warning young adults about the health risks of sugary drinks. **Hungary**: Since 2010, the Hungarian Aqua Promoting Programme in the Young (HAPPY) aims to increase water consumption among children and reduce the excessive consumption of sweetened drinks.
Restrictions on advertising and other forms of commercial promotion	**Norway**: Schools must ensure that students are not exposed to any kind of broadcast and non-broadcast advertising. **Peru**: National law bans all type of advertising of unhealthy food and beverages aimed at children. **United Kingdom** (local): The Mayor of London introduced restrictions on any type of advertising of unhealthy food and beverages across the entire Transport for London.

Source: World Cancer Research Fund International (n.d.[45]), OECD (2022[47]).

5.4. Inclusive processes for navigating the triple challenge

In the context of the triple challenge, policymakers are faced with multiple objectives and policy instruments, which inevitably involve synergies and trade-offs. Furthermore, policymakers need to overcome disagreements over facts, diverging interests, and differences over values, which often complicate policy design and political decision-making processes (OECD, 2021[1]). This section explores how Croatia is dealing with these paradigms, looking at elements that have proven useful in navigating the complexities of the triple challenge, such as policy coherence, engagement with stakeholders, and the use of scientific research (OECD, 2021[1]).

5.4.1. Regulatory tools for better policy coherence

Croatia has adopted a whole-of-government policy for regulatory quality

Over the past decade, Croatia has made significant progress in strengthening its regulatory policy framework. A key milestone was the introduction of a high-level commitment and vision for better regulation in the form of a whole-of-government policy for regulatory quality. This policy embraces the principles of evidence-based and transparent decision making but has a strong focus on administrative burden reduction efforts. Broadening the scope of the policy to focus also on social and environmental objectives

will enable the government to make full use of the potential of better regulation instruments for a holistic approach. The importance of whole-of-government policy packages for the transformation of agriculture and food systems was recognised by the 2022 OECD Declaration on Transformative Solutions for Sustainable Agriculture and Food Systems.[25]

Inter-ministerial co-ordination for food systems-related issues is regulated by different instruments and under the responsibility of different entities

Inter-ministerial co-ordination is essential to achieve food systems transformation. Strong inter-institutional mechanisms should integrate relevant actors and engage them in strategy development. Such mechanisms facilitate the identification of potential trade-offs and synergies, and offer the opportunity to discuss how best to address them (UN Food Systems Coordination Hub, 2021[48]).

As stated in Section 5.2, Croatia does not have a food systems law or integrated policy that simultaneously looks at the three elements of the triple challenge and at areas of interaction between different policies affecting food systems. In addition, and similar to most OECD Members, there is no single co-ordination body or mechanism that comprehensively covers food systems-related issues. Instead, multiple instruments regulate inter-agency co-ordination on food systems-related areas (e.g. the Law on Food for food safety issues or the Law on Agriculture for matters related to Codex Alimentarius).

Better inter-agency co-ordination could help Croatia to address several challenges and constraints to the performance of its agro-food sector. It could, for example, assist in the development of a specific export promotion strategy for the agro-food sector (presently not available), improve the country's trade facilitation performance (Section 2.6.2), and strengthen co-ordination amongst actors of the Agricultural Knowledge and Innovation System (AKIS). The government is undertaking efforts in this area, e.g. an AKIS Co-ordination Body has been created (Section 4.1.1).

Croatia is increasingly using regulatory impact assessments, but could benefit from broadening their scope

Regulatory Impact Assessments (RIA) are increasingly used as a routine "screening" of proposed new laws and regulations (OECD, 2018[49]), and are among the best practices to ensure that policies are based on the best available evidence. Preliminary findings from the OECD Regulatory Policy Committee suggest that Croatia could benefit from broadening the scope of RIAs and extending the requirement to conduct *ex post* evaluations for regulations that have a significant impact on the economy, citizens, or the environment. In the context of food systems, a better use of RIAs can help bridge disagreements over facts, contribute to policy coherence, and evaluate (or feed into) stakeholder consultations (OECD, 2021[1]).

Stakeholder engagement has improved for primary laws and subordinate regulations, but consultations occur late in the regulatory process

The lawmaking process applicable to all pieces of national legislation and to the transposition of EU legislation is defined by the Law on Better Regulation Policy Instruments,[26] in force since early 2024. This law strengthens the framework for impact assessment and evaluation, and includes additional standards for public consultation (European Commission, 2024[50]). It also introduces *ex post* regulatory impact assessment. Additional requirements apply to the transposition of EU law, including the preparation of a correspondence table between the provisions of EU and national regulations.

Croatia has developed an advanced framework for public consultations at the central state administration level, with a focus on online consultations in the later stage of the law-making process. Public consultation was first adopted in 2009 through a Code of Practice and later incorporated into law through an amendment to the Law on the Right of Access to Information. Draft laws and regulations must be published on an internet portal for a minimum of 30 days. Since 2015, public consultations are conducted through the online

portal *e-Savjetovanja*[27] (e-Consultations). Participation is open to all interested parties. Registration requires a personal identification number, which can be awarded to foreign parties (natural or legal persons) under the conditions established by law. Stakeholders such as business chambers, including from non-EU countries, often use the platform to provide comments on legislative proposals of interest.[28] As a result of this public consultation framework, Croatia performs better than most OECD Members when it comes to stakeholder engagement in developing both primary laws and subordinate regulations.

Specifically for the agro-food sector, the Ministry of Agriculture makes efforts to inform the public and stakeholders about draft agricultural legislation and its implementation. Stakeholders are included in the working groups in charge of drafting new legislation, and consultations are conducted regularly on specific topics, including EU legislative proposals in relevant areas. A good example of stakeholder engagement can be seen in the run-up to the 2023-27 CSP (Box 5.4) and the definition of the national Agricultural Strategy up to 2030 (Section 2.1.4). Nevertheless, early-stage consultations are not systematically undertaken as part of Croatia's policy making process.

Box 5.4. Stakeholder engagement in the preparation of Croatia's CSP

Following the mandate of Regulation (EU) 2021/2115, the government made significant efforts to ensure that stakeholders were engaged in the preparation of the 2023-27 CAP Strategic Plan (CSP) of Croatia. Activities were diverse in nature and included a wide range of stakeholders. The following is a brief description of three key means of engaging stakeholders throughout the process:

- **Meetings of the Monitoring Committee**: The body in charge of monitoring the 2014-20 CSP devoted an important part of their sessions to discuss the new CSP and the transition period this entailed. The Committee was composed of over 40 entities ranging from national, regional, and local governments to farmer associations, academia, and other private sector representatives.
- **Online consultations**: Continuous online engagement by the Ministry of Agriculture included workshops, document and email exchanges, surveys, interactive thematic presentations, and sector-specific communications.
- **Field consultations**: Three rounds of in-person consultations were organised in different regions of Croatia:
    - *June-July 2021*: The first draft documentation was discussed in five hybrid meetings open to the general public and key stakeholders. More than 4 000 people participated.
    - *October 2021*: This round focused on environmental issues and started with a two-day conference in Zagreb, followed by meetings with stakeholders in different regions of the country. Entities from all levels of government interacted with civil society organisations, local action groups, and farmer associations. Over 2 500 stakeholders participated in this second round. This round was followed by the 4th Croatian Rural Parliament, which gathered stakeholders from rural areas, with outputs from the discussion also feeding into the preparation of the CSP.
    - *May-June 2022*: The final round of discussions took place in Zagreb and followed a structured approach, focusing on targeted feedback from key stakeholders on specific areas of the CSP. Approximately 150 participants from a wide range of stakeholders provided detailed feedback.

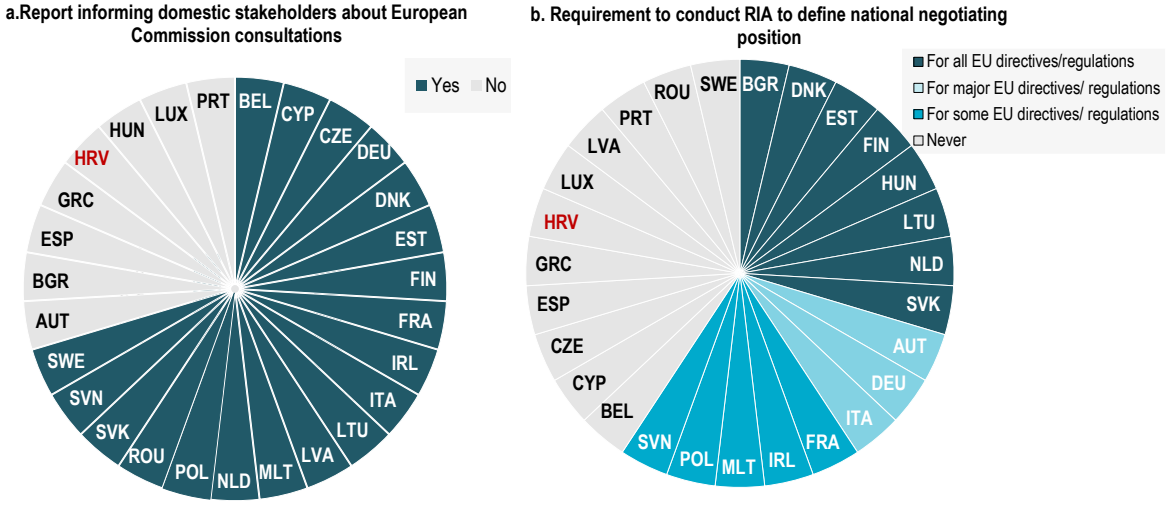
Source: Appendix 3 of CSP 2023-2027 (Ministry of Agriculture, 2022[13]).

5.4.2. Engagement at the EU and international levels

Stakeholder engagement for proposals at the EU level in Croatia is limited

In shared competence policy areas such as agriculture, EU Member States benefit more from the negotiations if they arrive at the negotiation phase with a good understanding of the potential impact of EU directives and regulations, including on domestic citizens and businesses. The regulatory management tools used by the European Commission are key to this end, and EU-wide impact assessments are a resource for EU Member States and are made available several weeks in advance of the negotiations. EU citizens are offered several opportunities to contribute to EU law-making process as it evolves, including through public consultations. In the context of these consultations, most EU Member States play an important role in ensuring that their stakeholders are informed of proposals that affect them (Figure 5.11, panel a). Some Member States go further and require national stakeholder consultations and/or RIAs to define their negotiating positions. In the case of Croatia, unlike most EU Member States, neither regulatory management tool is required during the negotiation stage (Figure 5.11).

Figure 5.11. Most EU Member States report informing domestic stakeholders about European Commission consultations and performing RIA to define their national negotiating position



Source: Indicators of Regulatory Policy and Governance (REG) Survey 2021

Croatia does not systematically inform its stakeholders about consultations at the EU level and only on some occasions does it use the European Commission's consultation results to inform its national position (OECD, 2022[51]).

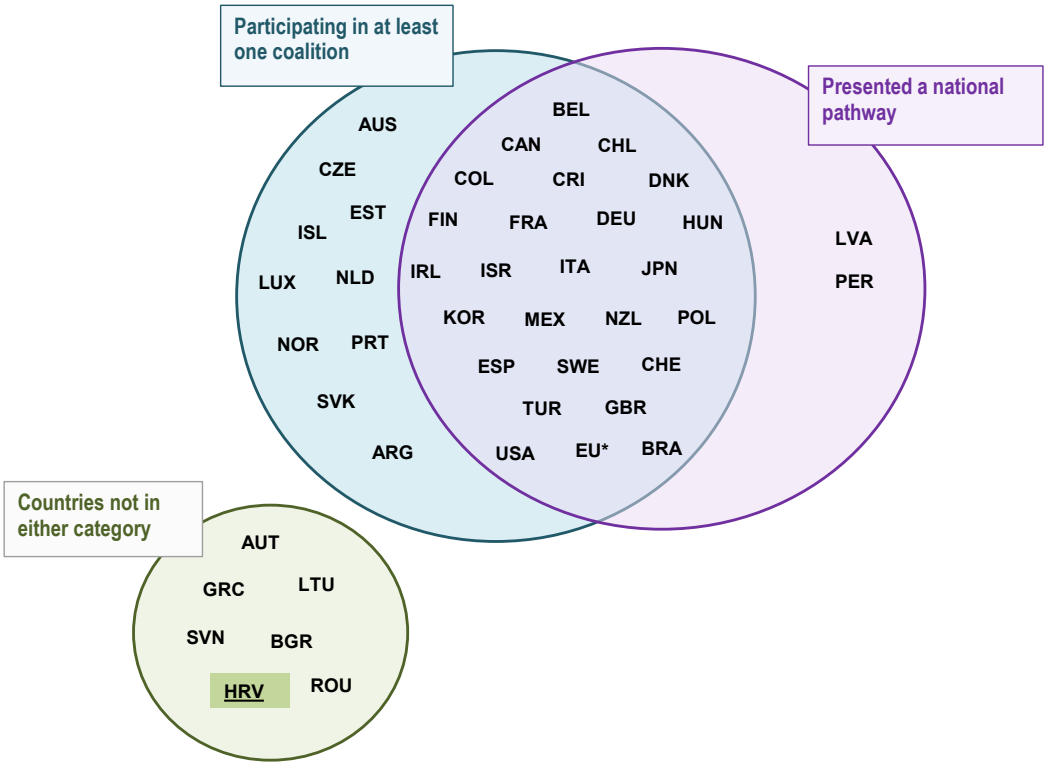
Relying solely on the results of the European Commission's consultations means that input by stakeholders is considered by Croatian authorities at a relatively late stage, losing the benefits of early-stage consultations. Furthermore, considering the different interests and methods of work of the EC and EU Member States, the same stakeholder input could influence policy development differently if submitted to the European Commission than if presented to an individual Member State (OECD, 2022[51]).

International engagement: The case of the Food Systems Summit

The UN Food Systems Summit (UNFSS) took place in September 2021. This summit gave participants an opportunity to discuss five axes or action areas, with follow-up stocktaking meetings to take place every two years.[29] Engagement by OECD Members has been high in relation to the different official and unofficial

initiatives in the context of the UNFSS. For example, 33 of the 38 OECD Member countries and the European Union have participated in at least one of the UNFSS coalitions, and 27 OECD Members and the European Union have presented national pathways (Figure 5.12). Despite its participation in the UNFSS and preparatory events, Croatia has not directly participated in any of the coalitions created in the context of the UNFSS, nor has it presented a national pathway.

Figure 5.12. Most OECD and accession countries participate in a UNFSS coalition and/or have presented a national pathway



Note: *Besides OECD Members and accession candidate countries, the list also includes the European Union.
Source: UN Food Systems Coordination Hub (n.d.[52]).

5.5. Conclusions

Food markets in Croatia are functioning correctly and are well integrated into global value chains. Market concentration is mostly moderate to low across the value chain. To improve and increase the position of farmers in the food value chain, Croatia's 2023-27 CSP includes interventions seeking to promote co-operation, quality schemes, and short value chains. However, past experience has shown that uptake and interest from farmers for these types of interventions has been low. Planned investments under the RRP can potentially strengthen some producer organisations and encourage farmers to participate in associative groups or organisations.

Croatia has adhered to the Council Recommendation on the OECD Due Diligence Guidelines for RBC and has established a National Contact Point. It has also adhered to the Recommendation of the Council on the OECD-FAO Guidance for Responsible Agricultural Supply Chains. Croatian authorities have undertaken promotional activities to support these Recommendations, but there is space for further action to disseminate the OECD-FAO Guidance and its active use by various stakeholders.

Croatia does not have a food systems law or integrated policy that simultaneously looks at the three elements of the triple challenge. As most OECD countries, Croatia has multiple policies guiding specific food system-related issues with responsible authorities scattered across jurisdictions, government agencies, and levels of government. Furthermore, agriculture policies are to a large extent decided at the EU level and governed by the CAP, and the participation of Croatian stakeholders in EU regulation processes is limited. Inter-ministerial co-ordination for food systems-related policies is key to identifying potential trade-offs and synergies, and how best to address them. Croatia, as most OECD countries, does not have a co-ordination body or mechanisms that comprehensively cover food systems policies. Multiple arrangements regulate horizontal co-ordination for specific topics or policy areas.

This chapter examined a selected set of issues that are important for food systems and which are drawing growing attention among OECD Members. Overall, Croatia has been taking action on shared OECD priorities with respect to meeting the triple challenge.

Significant progress has been made in measuring and preventing food waste, including an improved framework for food donations and the creation of county-level food banks. Treatment of food waste through composting and digestion has been steadily progressing, but per capita levels remain well below the average seen across the European Union. This situation contributes to municipal waste having a relatively large share in overall GHG emissions. Increasing food waste treatment requires the separate collection of bio-waste. Despite a recent EU mandate, Croatia does not have a separate bio-waste collection system that is convenient and accessible to most citizens across the country. Recommendations of the OECD Working Party on Resource Productivity and Waste (WPRPW) will be key to reducing the high contribution that municipal waste has to overall GHG emissions.

To encourage healthier consumption habits, Croatia has implemented an array of policies, including a school meals programme and a health promotion programme (“Healthy Living”). However, overweight and obesity are higher than the EU average and are increasing at a faster pace. The consumption of fruits and vegetables is decreasing in adults aged 15-34, a trend contrary to the one seen in most EU Member States. These trends suggest there is space for Croatia to strengthen its policy mix to encourage healthier food choices. To this end, Croatia could consider some of the measures implemented so far by other OECD and accession countries.

Agro-food policies, as policymaking in general, has benefitted from significant improvements in Croatia’s regulatory framework over the past decade. Encouraging early-stage stakeholder engagement, a strategic use of *ex post* assessments, and broadening the scope of RIAs could further result in better food system policies. There is space for Croatia to make better use of regulatory management tools when defining its national position to draft EU legislation. Other recommendations made by the OECD Regulatory Policy Committee will also be key to increasing policy coherence.

Croatia’s participation in UN Food Systems Summit’s initiatives seems to be lower than that of most OECD and accession countries. A more active engagement in initiatives such as coalitions or national pathways could help Croatia strengthen its food systems vision, improve the capacity of its policymakers, and increase the country’s influence at the international level.

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Notes

[1] Van Dam et al. (2021[5]) considered CR4 values below 40% to represent a competitive market. An indicator between 40% and 60% was considered a market with limited competition, while values above 60% were considered to indicate markets with limited competition and dominant firms in place.

[2] As explained in Chapter 1, in the former Yugoslavia an important share of agricultural land was in the hands of large socially owned enterprises (*agro-kombinats*) that were often horizontally and vertically integrated.

[3] Regulation (EU) No 1308/2013.

[4] In 2020, there were 3 719 recognised POs and APOs and 9 067 300 agricultural holdings at the EU level (Eurostat, n.d.[53]).

[5] 2018 data is available in Eurostat for Belgium, Bulgaria, Croatia, Czechia, France, Germany, Italy, and Spain.

[6] Information reported by Croatia to the OECD in the context of the yearly agricultural policy monitoring.

[7] See https://ec.europa.eu/agriculture/eambrosia/geographical-indications-register/.

[8] See https://www.e-trznica.hr/.

[9] The most populated cities after Zagreb are Split, Rijeka, Osijek, and Zadar.

[10] The OECD-FAO Guidance helps business operating along agricultural supply chains, as well as investors in the sector, operationalise risk-based due diligence in line with the recommendations of the OECD Due Diligence Guidelines for RBC (OECD, 2024[54]).

[11] Government of Croatia (n.d.), Brochure on the OECD-FAO Recommendations for Responsible Supply Chains in Agriculture, https://investcroatia.gov.hr/wp-content/uploads/2021/03/Preporuke-OECD-a-i-FAO-a-za-odgovorne-lance-opskrbe-u-poljoprivredi.pdf.

[12] The 2022 OECD Declaration on Transformative Solutions for Sustainable Agriculture and Food Systems refers to food loss and waste both in the commitments section, as well as in the call for the OECD to develop data, common metrics and analysis that helps measure progress. The OECD Trade and Agriculture Directorate published a stocktaking of food loss and waste policies (OECD, 2025[56]).

[13] Food insecurity is defined by FAO as the "lack of regular access to enough safe and nutritious food for normal growth and development and an active and healthy life" (FAO, 2023[55]).

[14] This includes children in pre-school, primary, and secondary school.

[15] Information reported by Croatia to the OECD in the context of the yearly agricultural policy monitoring.

[16] In 2017, an EU aid scheme for the supply of fruit and vegetables, bananas, and milk in educational establishments, known as the 'school scheme', was established by combining two previous schemes (the school milk scheme and the school fruit and vegetables scheme) under a single framework. See

https://agriculture.ec.europa.eu/common-agricultural-policy/market-measures/school-fruit-vegetables-and-milk-scheme/school-scheme-explained_en.

[17] The OECD's Product Market Regulation Indicators assess the alignment of a country's regulatory framework with internationally accepted best practices. The Economy-wide Indicator measures the distortions to competition that can be induced through the involvement of the State in the economy, as well as the barriers to entry and expansion that domestic and foreign firms face in different sectors of the economy.

[18] The PMR indicators range from 0 to 6. A lower value represents a more competition friendly regulatory regime.

[19] Commission delegated decision (EU) 2019/1597 (supplementing Directive 2008/98/EC of the European Parliament and of the Council as regards a common methodology and minimum quality requirements for the uniform measurement of levels of food waste).

[20] Bio-waste is composed of food waste and garden waste.

[21] Article 22 of Directive 2008/98/EC indicates that by 31 December 2023 Member States shall ensure bio-waste is either separated and recycled at source or is collected separately and is not mixed with other types of waste.

[22] Simplified nutrition labelling policies provide supplementary nutritional information in an easy-to-understand label displayed on food products at the front-of-pack (Giner, Rodriguez and Elasri, 2023[46]).

[23] The adoption of a mandatory front-of-pack nutrition labelling within the European Union was announced in its Farm to Fork Strategy of May 2020. The European Commission is to base its proposal on a full impact assessment of different policy options, as well as consultations with Member States and stakeholders and scientific advice (Giner, Rodriguez and Elasri, 2023[46]).

[24] Sugar in soft drinks is taxed depending on the amount of sugar in 100 millilitres of soft drink. The tax ranges from EUR 0.00 for drinks with up to two grammes of sugar per hectolitre to EUR 7.96 per hectolitre for beverages with more than 8g/hl.

[25] One of the commitments under this legal instrument is to "to support the transformation of agriculture and food systems towards more sustainability and resilience through a comprehensive approach by (…) Developing and implementing coherent, effective whole-of-government policy packages (…)".

[26] Official Gazette No. 155/2023.

[27] See https://esavjetovanja.gov.hr/ECon/Dashboard.

[28] As indicated by Croatia to the OECD Committee for Agriculture in July 2024. In addition, all interested parties, including from non-EU countries, have access to the public consultations conducted by the European Commission.

[29] (1) Nourish All People; (2) Boost Nature-based Solutions; (3) Advance Equitable Livelihoods, Decent Work and Empowered Communities;(4) Build Resilience to Vulnerabilities, Shocks and Stresses; and (5) Accelerating the Means of Implementation.

6 Agricultural policy performance in achieving national objectives

Food systems face the “triple challenge” of ensuring food security and nutrition, providing livelihoods to farmers and others in the food chain, and ensuring environmental sustainability. Solving this puzzle requires co-ordinated and synergic policies. This chapter examines Croatia’s policy objectives for the agriculture and food sector and assesses the path that the sector is taking in terms of productivity growth, greenhouse gas emissions and other agri-environmental trends.

Key messages

- Croatia's agricultural policy objectives seek to address economic, social and environmental issues and to foster innovation in the sector. EU policies, plans and strategies provide the main context and orientation, which is complemented by an agro-food strategy defined at the national level.
- Croatia has achieved a partially successful path of sustainable productivity growth. In the last decade, total factor productivity growth outperformed that of most peer countries and was a key driver of agricultural output growth.
- Productivity gains in the sector have reduced emissions intensity such that output has increased without an associated increase in greenhouse gas (GHG) emissions. A broader examination of agri-environmental indicators shows a mixed picture, with lower-than-average pesticide sales but above average use of synthetic nitrogen and phosphorus fertilisers and a recent increase in ammonia emissions.

6.1. EU and domestic policy objectives

6.1.1. Policy objectives

National objectives are formulated in the context of EU policies and strategies

As outlined in Chapter 2, Croatia's agricultural policies are developed in the context of its European Union membership. Thus, national policy objectives should be in line with the European Union's Common Agricultural Policy (CAP) and consider the broader policy direction given by EU-level plans and strategies such as the European Green Deal, the Farm to Fork Strategy and the Biodiversity Strategy.

In this context, a first level of policy objectives is provided by the goals agreed on by EU Member States for the 2023-27 reform of the CAP (Figure 6.1). The objectives focus on social, environmental and economic aspects, with knowledge and innovation as a cross-cutting goal for the sector.

Figure 6.1. EU policy sets the direction of national policy

Key policy objectives of the 2023-27 Common Agricultural Policy

Source: European Commission, *Key policy objectives of the CAP 2023-27*, https://agriculture.ec.europa.eu/common-agricultural-policy/cap-overview/cap-2023-27/key-policy-objectives-cap-2023-27_en (accessed February 2024).

At the national level, Croatia adopted in February 2022 the "Agricultural Strategy until 2030", which sets the framework for interventions in the agro-food sector financed by the 2023-27 CAP and the state, regional and local budgets (see also Section 2.1.4). The Strategy has four strategic objectives related to productivity and competitiveness, environmental sustainability and resilience, innovation, and life in rural areas (Figure 6.2). Like the CAP objectives, they cover economic and social aspects, environmental sustainability, and innovation. The specific interventions foreseen (implemented within the CAP, or as national programmes and measures) involve improved use of public funds for the agro-food sector, promoting a sustainable management of natural resources and climate adaptation and mitigation, developing the domestic market for agro-food products, encouraging entrepreneurship and business development, promoting new growth opportunities, and improving the link between agricultural knowledge and innovation (Ministry of Agriculture, 2022[1]).

Figure 6.2. National objectives cover economic, environmental, social, and innovation aspects

Objectives of Croatia's 2030 Strategy for the agro-food sector

Source: Adapted and translated from Ministry of Agriculture (2022[1]).

6.2. Benchmarking productivity and environmental sustainability performance compared with other OECD Members

Food systems around the world must deliver on a formidable "triple challenge": ensuring food security and nutrition for all, providing livelihoods to farmers and others in the food chain and promoting rural development, and ensuring environmental sustainability (OECD, 2021[2]). Given the global nature of the triple challenge, it is pertinent to assess the performance of Croatia − beyond its declared policy objectives − with regard to productivity, sustainability and resilience (OECD, 2020[3]). These three dimensions encompass many aspects of the economic, social and environmental goals of the CAP (OECD, 2023[4]) and match the national objectives of the Croatia 2030 Strategy. This section focuses on benchmarking environmentally sustainable productivity performance, analysing the path that the Croatian agricultural sector is taking in terms of productivity growth and main environmental outcomes, in particular GHG emissions. The overall assessment of Croatia is undertaken in the assessment and recommendations presented at the beginning of this report.

Solving the puzzle of the triple challenge requires co-ordinated and synergic policies that generate the innovations needed to meet policy objectives. Innovation not only encompasses technological advances, but also the pathway by which they transform the agricultural production system of a country. Policies need

to enhance productivity growth in a way that is environmentally sustainable. This entails achieving high Total Factor Productivity (TFP) growth and, at the same time, ensuring that the gains in efficiency are oriented towards creating a production system that fosters environmental sustainability.

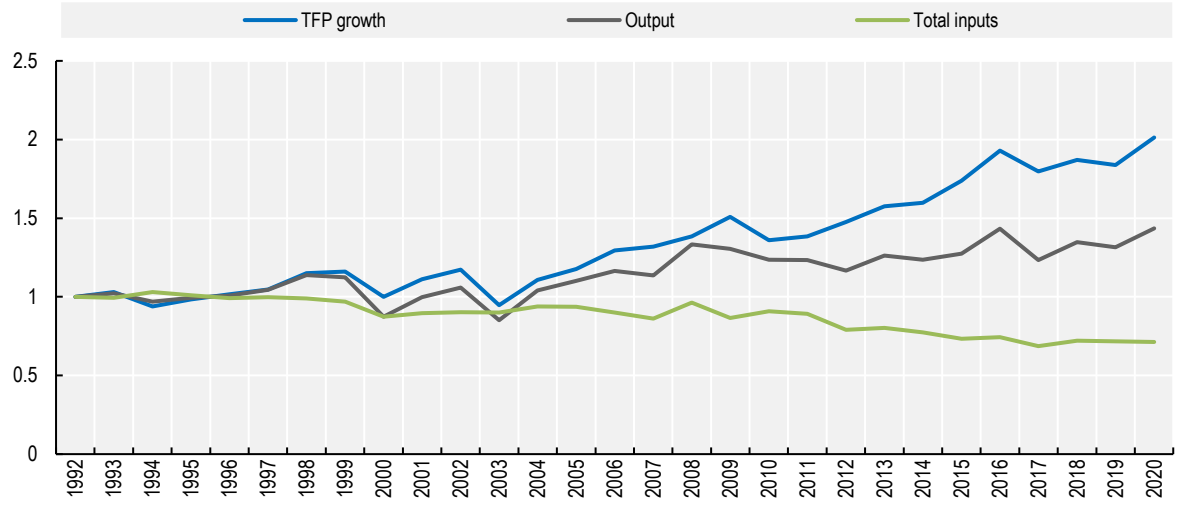
6.2.1. Agricultural productivity growth

Fast productivity growth in the last two decades has been a key driver of output growth

Agricultural total factor productivity (TFP) growth reflects the ability of the sector to use inputs and land more efficiently, thus achieving a higher output per unit of inputs or per hectare of land. In Croatia, productivity has been a primary driver of agricultural output growth. Between 1992 and 2021, Croatia experienced an overall decline in the use of agricultural inputs. TFP increases have mostly compensated a decade-long trend (Figure 6.3).

Figure 6.3. TFP has experienced strong growth in the last three decades

Evolution of agricultural output, input use and TFP growth, 1992-2021 (Index 1992=1)

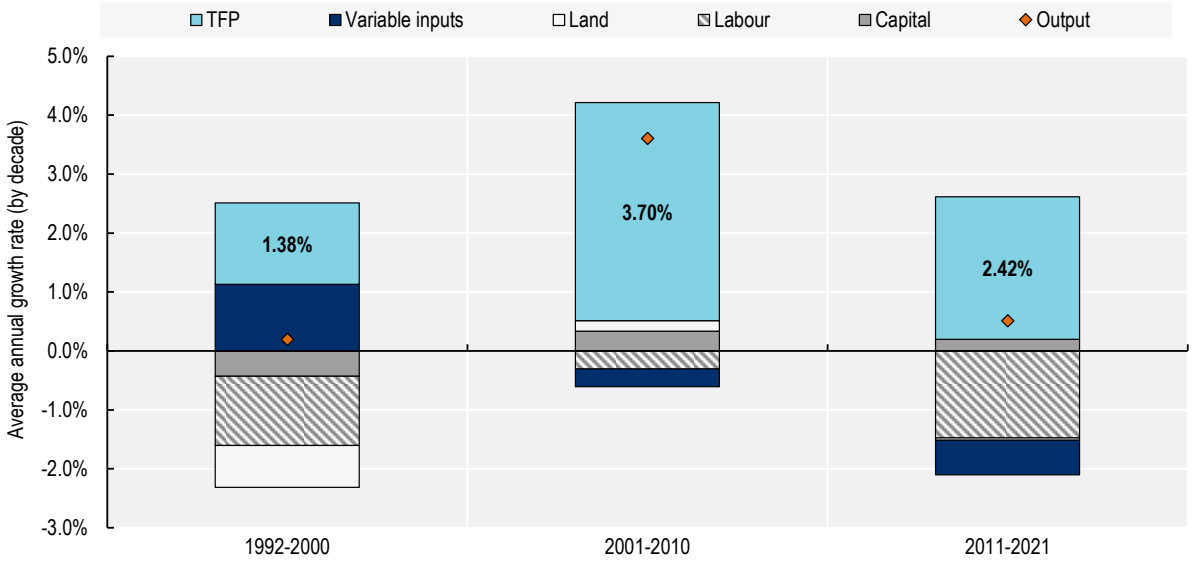


Note: TFP growth is calculated as a residual, equal to growth in output minus growth in inputs.
Source: Authors' calculations based on USDA (2022), International Agricultural Productivity (database).

Figure 6.4 shows the decomposition of agricultural output growth in the three decades[1] following Croatia's independence. The years between 1992 and 2000 are characterised by a significant increase in the use of variable inputs and a reduction of land, labour and capital. This is compatible with the situation of a country at once affected by war – which drove emigration and damaged agricultural land and infrastructure – and with policies having a high use of input subsidies (Section 2.1.1). Despite this reduction in total inputs, agricultural output experienced slight annual growth, driven by an average TFP growth of 1.4%.

Figure 6.4. Productivity has been the main driver of agricultural output growth

Decomposition of Croatia's agricultural output growth by decade



Note: TFP growth is calculated as a residual, equal to growth in output minus growth in inputs.
Source: Authors' calculations based on USDA (2022), International Agricultural Productivity (database).

The decade 2001-10 featured strong output growth driven almost exclusively by an average productivity increase of 3.7% per year. Minor recovery of capital investments and an increase in the use of agricultural land compensated minor declines in labour and in the use of variable inputs − a development compatible with the elimination of subsidies to fertilisers by 2000 as part of Croatia's World Trade Organization accession commitments.

Between 2011 and 2021, output grew at a much more moderate annual rate than in the previous decade: 0.5%, despite still high TFP growth of 2.4%. These outcomes are driven by a strong loss of agricultural labour, reflecting the country's trend of emigration-driven population loss accelerated by EU accession in 2013 (Section 1.4.3). The use of variable inputs also experienced a strong decline, consistent with the lower fertiliser application and falling pesticide sales detailed in Section 3.2.

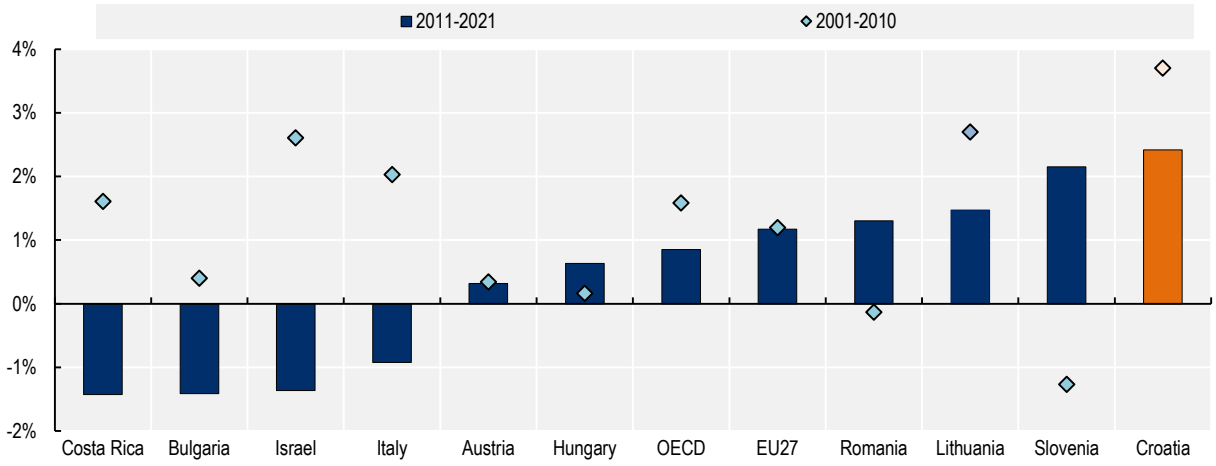
An analysis of technical efficiency at the farm level for 2014-16 found that Croatian farms on average had a low level of technical efficiency, which means there was scope for efficiency gains that could have been reflected in the sector´s productivity growth. However, there were important variations associated with farm characteristics. At both ends of the spectrum, both very small and large farms had a higher technical efficiency, while medium-sized farms were the least efficient. Younger farmers were found to be more efficient than older ones, and farms specialising in granivores (e.g. pig and poultry), horticulture, and wine were more efficient than those with other types of production. The farms that were technical efficiency "champions" showed a lower share of income dependence on direct payments (World Bank, 2019[5]).

Croatia outperformed peers in terms of productivity improvements

Despite the deceleration with respect to the previous decade, in 2011-21 Croatia still had the highest rates of productivity growth amongst peer countries (Figure 6.5). The average annual TFP growth of 2.4% was more than twice the average of the OECD (0.85%) and higher than the European Union average of 1.2%.

Figure 6.5. Croatia had a comparatively good productivity performance in the last decade

Agricultural TFP growth in Croatia and selected countries



Source: Authors' calculations based on USDA (2022), International Agricultural Productivity (database).

6.2.2. Sustainable productivity growth

Agricultural GHG emissions have declined, and productivity improvements compensated the higher GHG intensity of inputs

As shown in Section 3.5, emissions of greenhouse gases (GHG) from agriculture in Croatia have consistently declined since the 1990s, in the context of the structural adjustment of the sector and reduced livestock numbers. The sector is already below the emission reduction target of -16.7% by 2030 (compared with 2005 levels) for sectors not covered by the EU Emissions Trading System.

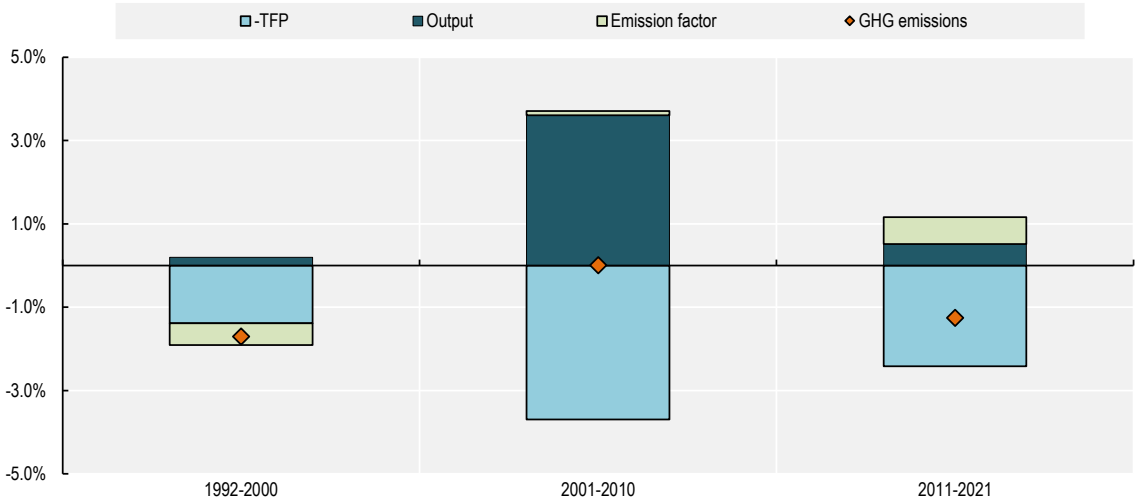
Given the triple challenge, countries need to find pathways to decouple[2] GHG emission growth from output growth. This can occur in two ways: i) by increasing the productivity (TFP) of the whole set of inputs, thus being able to produce more with less inputs; or ii) by reducing the GHG intensity of inputs, or the amount of agricultural GHG emissions per unit of inputs used (the "emission factor") (Henderson and Lankoski, 2023[6]).

The evolution of agricultural output and GHG emissions in Croatia since 1992 shows that Croatia has achieved absolute decoupling of GHG emission from production (Figure 6.6). There has been positive output growth along with declines (or zero growth, as in 2001-10) in emissions. This has been achieved as a result of significant TFP gains, showing how Croatia has combined productivity and sustainability.

As Figure 6.6 shows, in 2011-21 the absolute reduction in agricultural GHG emissions did not compensate the decline in input use, which resulted in an increase of the emission factor. The robust TFP growth observed during this period compensated for the increases in output and in the emission factor, leading to a decline in GHG emissions that was stronger than in the previous decade.

Figure 6.6. Productivity gains mitigated the increase in the GHG intensity of inputs

Decomposition of changes in agricultural GHG emissions in Croatia, 1992-2021

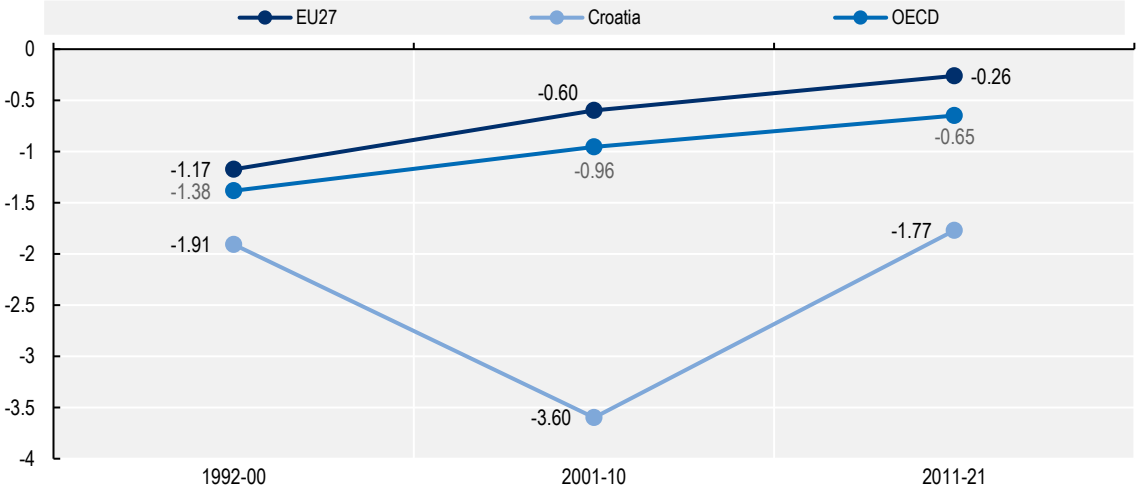


Note: Growth in output (dark green) and in emissions per unit of inputs (light green) contribute positively to the growth in GHG emissions (the diamond marker). Productivity (TFP) improvements (light blue) reduce emissions; thus, they are shown as negative values.
Source: Authors' calculations based on USDA (2022), International Agricultural Productivity (database); and OECD (2022) Agri-environmental indicators (database).

At the same time, the emission intensity[3] of Croatia's agriculture has decreased over the last three decades, as GHG emissions from agriculture have grown at a slower rate than the sector's output − or indeed declined. Between 1992 and 2021, Croatia performed better than the EU and OECD averages in terms of emissions intensity reductions (Figure 6.7). The rate of emissions reduction, however, has decelerated in the last decade.

Figure 6.7. Croatia outperforms the European Union and OECD Members in terms of emission reductions

Evolution of changes in agricultural GHG emission intensity in Croatia, the European Union and OECD, 1992–2021



Note: Emission intensity measures the amount of greenhouse gases emitted per unit of output. Lower numbers show greater improvement.
Source: Authors' calculations based on USDA (2022), International Agricultural Productivity (database) and OECD (2022) Agri-environmental indicators (database).

Other agri-environmental trends show a mixed picture

Pesticide sales had a strong decline following EU accession and remain well below the EU average. However, nutrient use trends show that the input of synthetic nitrogen (N) and phosphorus (P) fertilisers remains above the EU average (Section 3.2.5). Both N and P input per hectare started increasing after reaching their lowest level in 2016, even if they remain below their 2000 level. While the balances of both nutrients have improved over the past decade, they remain above the EU average and, in the case of nitrogen, above the OECD average.

The evolution of ammonia emissions, which mainly originate from the agricultural sector, also deserves attention. While the intensity of ammonia emissions declined after 2009 due primarily to the reduction in animal numbers, this trend stopped in 2013 and reverted to an upward trend after 2016, putting Croatia at risk of not meeting its national target for 2030 (Section 3.2.6).

6.3. Conclusions

Croatia's national policy objectives are formulated in the context of the EU Common Agricultural Policy and the broader social and environmental goals of the European Union. The country also undertook a national process to develop a strategy for the agro-food sector and has used the space available within the CAP to implement additional measures at the national level. Croatia's agro-food policy objectives cover economic and social aspects, environmental sustainability, and innovation.

Despite the important challenges faced in the last decades and numerous pending tasks, Croatia has managed to develop an agricultural sector that is productive. Total factor productivity has experienced remarkable growth in recent decades, outperforming most peer countries, and has been a key driver of agricultural output growth and the reduction in GHG emissions. At the farm level, there are technical efficiency divergences among different holding types, with mid-sized farms showing the lowest efficiency.

Thanks to productivity gains, Croatia has improved its agricultural output without an associated increase in agricultural GHG emissions, but rather reducing emissions and emission intensity from agriculture. Sales of pesticides have also strongly declined over the last decade. However, trends for other agri-environmental indicators, such as nutrient balances and ammonia emissions, show a mixed picture.

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Notes

[1] In order to cover all the available data in the analysis, the final "decade" has been expanded to include 2021, while the first one does not include 1991 (no data for Croatia is available for that year).

[2] Decoupling occurs when the growth rate of an environmental pressure is less than that of its economic driving force over a given period. Absolute decoupling is said to occur when the environmentally relevant variable is stable or decreasing while the economic driving force is growing. Decoupling is said to be relative when the growth rate of the environmentally relevant variable is positive, but less than the growth rate of the economic variable (OECD, 2002[7]).

[3] "Emission intensity" measures the amount of greenhouse gases emitted (E) per unit of output (Y). It is calculated as the ratio between total GHG emissions generated in agriculture and the value of total agricultural output: EI = E / Y. The growth rate in emission intensity is, therefore, the difference between the growth rates of total emissions and of production. Whenever total GHG emissions grow at a slower rate than output, the emission intensity of output decreases, i.e. its growth rate is negative.

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