European Parliament

Future-proofing the vision for agriculture and food

IN-DEPTH ANALYSIS

EN

Future-proofing the vision for agriculture and food

The European Commission's vision for agriculture and food aims to ensure the agricultural sector's long-term competitiveness and sustainability. We have provided a pre-legislative foresight analysis to future-proof this vision, with a foresight wind-tunnelling exercise. Twelve carefully-chosen vision statements were tested against four plausible future scenarios for their robustness and future-readiness. The study highlights the need for more policy coherence and better coordination to address complex challenges for the agricultural and food sector, such as climate change and social inequalities. This requires a proactive and holistic approach from EU policymakers to achieve this vision, while taking into account different plausible future conditions in which we might need to live.

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Executive summary

The European Commission's communication on a vision for agriculture and food, published in February 2025, aims to secure the long-term competitiveness and sustainability of the farming and food sector. The document consists of four distinct parts: making agriculture an attractive sector with affordable food for all, a competitive and resilient sector, a future-proof sector that is sustainable and contributes to food security, and a vibrant sector with fair living and working conditions.

To future-proof the vision, a foresight 'wind-tunnelling' exercise was conducted using the Reference foresight scenarios on the global standing of the EU in 2040, developed by the European Commission's Joint Research Centre. The scenarios (Storms, Endgame, Struggling synergies, and Opposing views), provide a set of four different plausible contexts to test the vision, with a view to suggesting developments that would make it more robust.

While the scenarios do not predict the future, they can point towards challenges and opportunities the future might bring. The participatory workshop we conducted in March 2025 showed that vision statements appear to be more plausible in scenarios where sustainability, environmental protection, and social cohesion are prioritised. In contrast, they may be less robust if the focus is stronger on economic growth, competitiveness, and deregulation, while putting issues such as sustainability or social cohesion aside.

The EPRS foresight analysis of 12 vision statements across the four scenarios shows that the Commission's statements related to sustainable protein sources, reduction of strategic dependencies and digitalisation are the most robust and work across the majority of scenarios. However – and while very important for the future of the sector – food labelling and functional rural areas might need to be made more robust to perform better across a range of different futures.

The foresight exercise also highlighted the need for stronger policy coherence and more careful coordination to address the complex challenges facing the agricultural and food sector and achieve the vision, including climate change, social inequalities, and environmental degradation. Carrying out the vision will not be straightforward; the analysis shows that the document does not sufficiently consider the impact of factors outside the European Union's control. Greater coherence between policies and more anticipatory governance in policymaking is therefore needed to ensure the future of agriculture and food in the EU.

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1. Introduction

1.1. Background

The agri-food sector is a strategic sector for Europe. It is also a critical asset, as it needs to ensure the security and resilience of food supply and food production in the European Union. The EU has a range of policy instruments, including the common agricultural policy (CAP), allowing it to shape the agri-food sector and implement its strategic objectives. These policies influence the sector's development, competitiveness, and sustainability, as well as its contribution to broader EU goals, such as the European Green Deal.

While the sector is vulnerable to various challenges, such as climate change, it also has the capacity to adapt and innovate. Policies also need to be more future-oriented, as well as tailored to local needs, to become more resilient. This would ensure that the agri-food system is sustainable, attractive, competitive and fair, today and tomorrow.

In this context, this paper examines the recently published European Commission communication on a 'Vision for agriculture and food'[1] – and 'future-proofs' its different sections. It explores different options to make the vision more robust and able to resist different future contexts.

While the agricultural sector traditionally relies on modelling, it also faces numerous challenges and uncertainties that cannot always be sufficiently examined through quantification and forecasting. This is where the use of foresight and scenarios provides a framework to apply a foresight method known as wind-tunnelling to different parts from the vision and discuss how they can be improved, in a participatory setting. The use of collective intelligence on the one hand, and the possibility to ask 'what if' questions on the other, provides an added value to other tools and methods used. This approach pushes us to think about different futures, place the vision within them, and act to make future policies more resilient.

To enhance food security and sustainability, it is vital to consider the interactions between the EU policy landscape, the United Nations' Sustainable Development Goals (SDGs) and key players in the field (including farmers, agricultural and food companies, researchers, and policymakers). However, many uncertainties lie ahead, ranging from the impacts of climate change on agriculture and arable land to ensuring food security for all.

1.2. EU policy landscape

The common agricultural policy (CAP) plays a crucial role in shaping the EU agricultural landscape. The CAP's foundations have remained unchanged since the Treaty of Rome, with the exception of the decision-making procedures. The objectives, as stated in Art. 39 if the Treaty on the Functioning of the EU, are to increase agricultural productivity through technical progress and labour, ensure a fair standard of living for farmers, stabilise markets, safeguard the availability of supplies, and reach reasonable prices for consumers.

The European Green Deal[2] (EGD) and associated policy documents and targets are also key to understanding the development of trends and weak signals of change in this area. Sustainable

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[1]   European Commission, A Vision for Agriculture and Food: Shaping together an attractive farming and agri-food sector for future generations, COM/2025/75 final.

[2]   European Commission, Communication on The European Green Deal, COM(2019) 640 final, 2019.

agriculture is also an important part of the SDG 2, which focuses on ending hunger. The CAP plays a leading role in advancing the UN's SDG 2 objectives and developments across the Member States.

During 2019-2024, the agricultural and food sector came under pressure, due to the COVID-19 pandemic, Russia's invasion of Ukraine, and farmers' protests – after which the Commission proposed a reduction in environmental obligations and related penalties for small farms. The revised CAP (2023-2027) considers 10 strategic objectives. These are: to ensure a fair income for farmers; to increase competitiveness; to improve the position of farmers in the food chain; to take climate change action; to promote environmental care; to preserve landscapes and biodiversity; to support generational renewal; to foster vibrant rural areas; to protect food and health quality; to foster knowledge and innovation.[3] Based on them, Member States developed their national strategic plans. Also, the EU Directive on unfair trading practices[4] aims at protecting the food supply chain and particularly weaker suppliers from exploitation and abusive behaviours, which could also make agricultural enterprises more financially sustainable.

One of the Commission priorities for 2024-2029[5] is food security and ensuring a competitive and resilient agriculture and food system, while protecting biodiversity. Access to high quality food is closely tied to quality of life in general. Current EU agricultural policies seek to balance agricultural productivity with environmental sustainability. However, mandatory requirements ('conditionality') have been recently reduced and voluntary requirements (eco-schemes, agri-environmental schemes, green investments) have not been implemented equally across Member States. Therefore, funding mechanisms may need to be adjusted to support sustainability goals more effectively.[6] This could involve reforming agricultural subsidies to better align with environmental and social objectives, ensuring that they contribute to a more sustainable food system.

In 2024, the Commission launched a strategic dialogue,[7] a multistakeholder platform, to discuss the future of agriculture and food. The outcomes were published in a report with a set of recommendations. They also served as a basis for the 2025 vision for agriculture and food.

1.3. European Parliament position

During its ninth term, the Parliament worked on a large number of policy files and resolutions related to agriculture and food. The majority of this work was carried out by its Committee on Agriculture and Rural Development (AGRI), which reviews, modifies and scrutinise the Commission's legislative proposals related to agriculture.

In its resolution on mental health of December 2023, the Parliament supported the Commission's statement on the need to focus on challenges related to the mental health of people living in remote and rural areas, including farmers. It proposed specific initiatives to ease access to such specialised health services.

The CAP amendments on environmental conditionality, proposed by the Commission in March 2024, were adopted by the Parliament in April of the same year. Member States obtained more flexibility

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[3]   European Commission, Key policy objectives of the CAP 2023-27, 2023.

[4]   Directive (EU) 2019/633, on unfair trading practices in business-to-business relationships in the agricultural and food supply chain, 2019.

[5]   European Commission, Commission priorities for 2024-2029, 2024.

[6]   N. Šajn, Environment and the common agricultural policies, EPRS, European Parliament, July 2024.

[7]   European Commission, Strategic dialogue on the future of agriculture, 2024.

for possible exemptions in case of extreme weather conditions or for small farms that do not comply with some CAP rules.

With strong backing from the European Parliament, the EU introduced mandatory social conditionality in EU Member States from 2025, under which farmers receiving CAP funding must respect social and labour rights and provide safe and healthy working environments.

Following the publication of the 'Vision for agriculture and food', a debate in Parliament was held in March 2025, in the presence of Commissioner for Agriculture and Food, Christophe Hansen, who presented the vision and engaged in the debate.

Parliament is expected to consider a motion for a resolution on the future of agriculture and the post-2027 common agricultural policy later this year.

1.4. Main trends shaping EU policy in agriculture and food

The agri-food system is under pressure, and faces diverse challenges across social, technological, economic, environmental and political (STEEP) area dimensions but also presents substantial opportunities for the future. With the ongoing green and digital transition, the trends listed below show a further push for sustainability, a need for policy adaptation, and the challenges posed by structural changes, all of which are critical for ensuring food security in the future.

Sustainability and environmental concerns are a main theme within European agricultural area, aligning food systems with the SDGs, the European Green Deal (EGD) and the Farm to Fork (F2F) strategy.[8] These concerns, emphasised in the EGD, stress the need for a transition to a sustainable food system that mitigates climate change, enhances biodiversity and improves agricultural sustainability. Food system sustainability is important to supporting climate change mitigation efforts and reducing environmental degradation. Agricultural transformation consists of changes that are already present in agricultural practices to some extent, including the adoption of precision agriculture, organic farming, and agro-ecology.

An increasing impact of **globalisation and Europeanisation** on rural areas includes the effects of trade liberalisation, migration, and related EU policies. EU farmers and companies can benefit from new opportunities to **access global markets**, based on **new trade agreements**, particularly in countries with growing demand for high-quality food products.[9] **Farm income has gradually increased** since 2013. Growth during 2013 to 2021 was over 50 %, with a temporary slowdown seen only during the COVID-19 pandemic. This trend is due to the higher production value compared to the costs, and the decline in the number of workers on a farm.[10]

The **dominance of large farms** has been influenced by EU policies that favoured larger agricultural operations.[11] For example, this is particularly evident in the Baltic Sea region, where there has been a decline in small farms and a reduction in agricultural labour input. This could put the resilience of

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[8]   I. Cuadros-Casanova, A. Cristiano, D. Biancolini, M. Cimatti, A. Sessa, V. Yeraldin Mendez Angarita, C. Dragonetti, M. Pacifici, C. Rondinini and M. Di Marco, Opportunities and Challenges for Common Agricultural Policy Reform to Support the European Green Deal, Conservation Biology, 37 (3): 14052, 2023.

[9]   C. Emlinger and H. Guimbard, Trade aspects of the Strategic Dialogue on the future of EU agriculture and the impact of trade on the competitiveness and sustainability of European agriculture, European Parliament, 2025.

[10]   European Commission, Explore farm incomes in the EU, Farm economics overview based on 2021 FADN data, DG Agriculture and Rural Development, Brussels, 2023.

[11]   A. Maggio, T. Van Criekinge and J.P. Malingreau, Global food security: assessing trends in view of guiding future EU policies, *Foresight*, Vol. 18 No. 5, 2016, pp. 551-560.

the food system into question, as it may lead to a potentially reduced crop variety and polyculture, as well as a loss of future competence and knowledge for farming.[12]

Another strong trend is the **digitalisation of agriculture**.[13] This is particularly pertinent for the development of resource-efficient farming that includes, for instance, precision agriculture and vertical farming. The EU also invests heavily in research and innovation, supporting the development and adoption of digital technologies in agriculture and innovative solutions. In the future, EU policies and initiatives can play a vital role in this area to ensure that EU farmers can benefit from these technologies through investment and digital skills development, while safeguarding their rights. By doing so, the digital transformation can contribute to achieving several SDGs by enhancing food security, improving the sustainability and efficiency of the agricultural sector, and increasing its efficiency. For instance, the common European agricultural data space (CEADS) aims to facilitate data sharing, pooling, and analysis, which can have a positive impact on the sector.[14]

Changing demographics is a megatrend that is considered to have a large impact on both agriculture and food. The global population is increasing and, according to many projections will reach almost 10 billion by 2050. This will lead to an increased food demand. At the same time, low numbers of young farmers and an ageing population will additionally affect the European agricultural workforce.

Similarly, **urbanisation and shifting rural-urban dynamics** are also important to the agri-food sector. With rural areas suffering from outmigration and consequent depopulation, some predictions state that two thirds of population will live in cities by 2050.[15] This is closely linked to changing societal values. Growing urbanisation also means shrinking agricultural land – the importance of urban agriculture is therefore increasing. **Urban agriculture** could contribute to food security and environmental sustainability within urban areas.[16] Urban micro-farming (such as rooftop farms) and indoor controlled environment agriculture, as well as biotech start-ups, have the potential to shape the future of global agriculture by helping to meet the food needs of urban populations. It can also enhance community resilience by fostering and empowering local communities.

Global hunger levels have risen to an alarming level since the COVID-19 pandemic and according to United Nations and World Health Organization estimations, around 733 million people (9.2 % of the global population) are undernourished. This means that SDG2 to end hunger and food insecurity might not be achieved. Furthermore, it is expected that the population at risk of hunger will increase by 8 % by 2050.

The **demand for healthy, sustainable, and locally produced food** is increasing, with a focus on environmental and social welfare. The EU aims to **expand organic farming**, targeting 25 % of agricultural land for organic production by 2030. Current incentives are insufficient to meet this goal, necessitating the development of new strategies to encourage farmers to transition to organic practices. The integration of organic farming could support the achievement of the SDGs in minimising negative impacts on the environment and human health.

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[12] P. Ambros and M. Granvik, Trends in Agricultural Land in EU Countries of the Baltic Sea Region from the Perspective of Resilience and Food Security, Sustainability, 2020, Vol. 12, No. 14.

[13] Y. Barabanova and M. Krzysztofowicz, Digital Transition: Long-term Implications for EU Farmers and Rural Communities, Publications Office of the European Union, 2023, JRC134571.

[14] European Commission, Rolling out the Common European Agricultural Data Space, 2024.

[15] United Nations, 68% of the world population projected to live in urban areas by 2050, says UN, UN Department of economic and social affairs, 2023.

[16] J. Smith, *Urban Farming Perspectives*, Publifye, 2025.

1.5. Vision for agriculture and food

In February 2025, the European Commission published a 'Communication on the Vision for Agriculture and Food'. The document is based on insights obtained through strategic dialogues – an expert-based European Commission initiative launched in January 2024. The Commission's communication sets out a goal to secure the long-term competitiveness and sustainability of the farming and food sector. According to the vision, fair income, public support and transparency in the food chain are necessary, as well as addressing unfair practices and diversifying income sources. Simplification is present as a cross-cutting issue, as well as making farming attractive and using new digital technologies. With these measures, future generations of farmers are encouraged to pursue agricultural careers, foster innovative businesses, secure a thriving agri-food sector and a fair revenue. The vision consists of four distinct parts that explain how the agri-food sector can become:

1. an attractive sector with affordable food for all, fair farmers' incomes and a fair food chain;
2. a competitive and resilient sector, with reduced critical dependencies;
3. a future-proof sector, which is sustainable, contributes to food security, and functions within the 'One Health' approach;[17]
4. a vibrant sector with fair living and working conditions, access to public services and the EU leading in food innovation and safety.

The vision was presented to the Parliament's plenary session in March 2025, followed by a discussion in the Committee on Agriculture and Rural Development (AGRI). Topics discussed included issues mentioned in the vision and related policies, such as: the European Green Deal; the planned trade agreement with Mercosur; making the CAP future-oriented; the small percentage of farmers under 35 years old; which elements of the vision should be prioritised; reducing bureaucracy; ensuring farmers are at the centre of the discussion; and the need for a depolarisation of the debate.

2. Insights from a foresight process

2.1. Approach

For the purpose of this foresight exercise, we used 12 statements and assumptions taken from the vision and transformed them into statements for the year 2040. We then wind-tunnelled them against the European Commission Joint Research Centre's reference foresight scenarios.[18]

(Reference) foresight scenarios can be used to future-proof a specific policy, strategy or vision.[19] In this process, scenarios serve as a set of different context conditions that help test the strategy, improve it and make it sufficiently robust and flexible. Through the assessment of a strategy against a set of distinct plausible futures, policymakers can improve the strategy and increase their capacity to deal with the different uncertainties that must be faced between now and 2040.

The reference foresight scenarios were initially created to be used in ex-ante impact assessment and related foresight exercises in support of EU policymaking across a larger number of different policies. **Storms, Endgame, Struggling synergies and Opposing views** provide four plausible

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[17] According to the World Health organisation, One Health is an approach that looks at the health of people, animals and the ecosystem in an integrated way, acknowledging their interdependence.

[18] L. Vesnic-Alujevic, S. Muench and E. Stoermer, Reference foresight scenarios on the global standing of EU in 2040, Publications Office of the EU, 2023.

[19] K. Van der Heijden, R. Bradfield, G. Burt, G. Crains and G. Wright, The Sixth Sense, Chichester: John Wiley and Sons, 2002.

scenarios that should always be considered as a set, and not individually. They consider the EU's future standing in a holistic perspective, across the STEEP dimensions, including uncertainties such as the source of geopolitical power; environmental degradation; food, water, health and energy nexus; and technological developments.

A participatory workshop was organised in March 2025 to discuss and wind-tunnel these statements within the selected scenario set. Internal experts from units across Parliament were invited to participate. In addition to the integral text of the scenarios, shorter adapted version was provided for the purpose of the workshop, emphasising factors that are the most relevant for the field of agriculture and food. Vision statements were selected based on their importance and the level of uncertainty surrounding the future development of the sector. These cover all four parts of the vision and various STEEP dimensions.

This paper summarises the insights gained in the workshop, complemented with desk research and subsequent foresight analysis. For each theme and related vision statement, an overview of the main trends, challenges and opportunities is given, based on a brief literature review. This is followed by a discussion of the plausibility of each statement within each foresight scenario.

The 12 vision statements selected relate to: i) increased circularity and bioeconomy; ii) farmers' position in the value chain; iii) regulatory simplification; iv) reduction of strategic dependencies and biopesticides; v) risk management and climate resilience; vi) sustainable protein production; vii) a bio-based economy; viii) greenhouse gas (GHG) emissions reduction; ix) food supply chains; x) food labelling; xi) functional rural areas and public services; xii) food waste and sustainable consumption.

Summaries of the reference foresight scenarios are given below as well as the main factors across four scenarios.

Figure 1 – Summary of Reference foresight scenarios

Storms
Global co-operation has collapsed and the world is divided into blocks. Each geopolitical block is protecting its own way of life. Strategic autonomy is the credo. Scarcity is the new normal, leading to hostility between the blocks. The collapse of multilateralism made a globally co-ordinated approach to climate mitigation and environmental protection impossible. Social equality and the protection of minorities are not priorities.
Endgame
Economic growth outdoes wellbeing. The international competition for companies and jobs increased the power of businesses over governments. Innovation is seen as the means to achieve competitive advantages mainly through higher efficiency and access to new types of resources. Authoritarian powers and the rise of populism lead to a lower protection of the environment and human rights.
Struggling Synergies
While there is strong multilateral determination to fight climate change, other environmental, economic, and social aspects of sustainability are side-lined. Technology leadership in low- or zero-carbon technologies is a determinant of success. Social inequalities have increased. Citizens increasingly struggle to find a balance between global values and their personal desires, namely at the crux of consumption and sustainability.
Opposing Views
A green enlightened and euro-centric elite leads the interests of future generations in a progressive global block, the 'regenerative alliance'. Social equality and environmental sustainability are the top priorities in the regenerative alliance. There is an 'exploitative alliance' centred on Brazil, Russia, India, and China and follows a different approach. Economics and efficiency are at the centre, without being steered by sustainability goals.

Source: L. Vesnic-Alujevic, S. Muench and E. Stoermer, Reference foresight scenarios on the global standing of EU in 2040, Publications Office of the EU, 2023; Illustrations by Heyko Stöber.

Table 1 – Main characteristics of scenarios used for the purpose of this exercise

	Storms	Endgame	Struggling synergies	Opposing views
How does Europe function?	EU Member States are functioning democracies. Conservative elderly dominate the political agenda. Disillusioned youth retreat from politics. Internal tensions.	Private corporations dominate, weakened public institutions. Low levels of taxation. EU is united in protecting its borders. Multi-tier Europe.	The EU is a slow-moving bureaucracy. Regional representatives form a separate chamber in the European Parliament. Governments regulate and monitor environmental performance. Parts of society feel left out by experts and believe in conspiracies.	The green transition has become a compass for EU policymaking. Governments invest heavily in R&D and state-owned technology providers. Governments are responsible for societal equality and redistribution of wealth.
What is the situation of Europe's institutional memberships?	EU expansion in the Balkans, initially contingent on strict control on movement. Decisions are taken by majority.	Some countries enter, some exit the EU. Two-phase membership leads to inner and outer circles of Member States. New community of associated countries align on energy, transport, and infrastructure.	EU becomes a looser union as multilateral institutions gain importance. Two South Mediterranean countries leave the EU. The European Economic Area expands.	Some North African countries align with the EU through a southern energy hub. The European Economic Area is open to countries that align with the regenerative alliance.
How has global society reacted to environmental degradation?	Climate change trajectory 2100: 3°C. No global consensus. Less-impacted northern countries adapt and reduce vulnerability. High human costs in other regions.	Climate change trajectory 2100: 4°C. Collapse of natural ecosystems (e.g., seafood exhausted). Extreme effects of climate change are frequent and costly.	Climate change trajectory 2100: 1.5°C. World collectively engaged in actively co-creating a more sustainable society. Global South benefits from climate mitigation and leads to the growth of emerging economies.	Climate change trajectory 2100: 2.5°C. In the regenerative alliance, GDP is replaced by sustainability indicators. The exploitative alliance prioritises economic wealth.
How has the nexus of food, water, energy, and health evolved?	Regions affected differently. Energy depends on regional availability (fossil,	Desertification and water scarcity across the planet. Synthetic food.	Similar water situation as in the past 20 years. The global energy	Water scarcity increases slightly. Crop yields decline. The

	nuclear, renewable).Spread of disease due to global warming.	Energy is a fossil and renewable mix. Wealth means health.	transition has accelerated. Negative impacts of obesity and poor mental health, particularly in Northern Hemisphere.	energy mix depends on the respective alliance. Increased healthy lifestyles widely accepted in regenerative alliances.

Source: L. Vesnic-Alujevic, S. Muench and E. Stoermer, Reference foresight scenarios on the global standing of EU in 2040, Publications Office of the EU, 2023.

2.2. Wind-tunnelling the vision statements

2.2.1. Overall assessment

By examining several elements, the workshop participants agreed that the vision outlines a strategy that still largely lacks clearer actions and more tangible steps. The vision presents numerous ambitious initiatives, but fails to articulate clearly the potential trade-offs, taking account of the high number of uncertainties that may arise and we may face between today and 2040. Making deliberate choices and compromising between the diverse desirable elements of the vision might be necessary, especially in the context of the ongoing digital and green transitions, where conflicting priorities and interests might emerge.

One of the most important requirements for the vision to materialise will be the allocation of the CAP budget, with a notable increase in funding needed to support many aspects of the vision. The outcome of national politics and election results between 2025 and 2040 will be instrumental in shaping the realisation of different elements of the vision. While innovation will play a vital role, it is equally important to consider how to effectively use it to drive a positive change for society.

Workshop participants emphasised the need to look beyond the agri-food sector in a holistic way. For this, foresight is useful as it enables us to look at the vision from a 360-degree perspective, while acknowledging plausible future context conditions. For example, in a future world dominated by hostilities and conflicts, agriculture might not be a priority and investment in this sector may be limited, thereby hindering the realisation of certain elements of the vision.

When it comes to food, education and awareness-raising can help facilitate changes in dietary habits. For this to happen, ensuring sustainable food is an easy option for consumers would be necessary. The workshop participants proposed abandoning a top-down approach to dietary changes (with general directions for dietary improvements, for example, through increasing available information) and instead focusing more on individual food choices (based on food availability, personal habits, economic and social conditions, etc.) . While consumers wish to eat more sustainably, sustainable food options need to be aligned with food price and affordability.

The overall assessment of the tested statements across all four scenarios revealed that they are more plausible and robust in scenarios that prioritise sustainability, environmental protection and social cohesion (**Opposing views** and to some extent **Struggling synergies**). In contrast, they may be less robust in scenarios with a stronger focus on economic growth, competitiveness, and deregulation (**Endgame**). In a more complex and challenging geopolitical context (**Storms**), the plausibility and robustness of the statements may vary depending on the specific circumstances. While we cannot predict the future, the aim of a foresight exercise is to increase preparedness for unforeseen circumstances, by making choices that could be plausible across a larger number of diverse futures.

The table below gives an overview of this quantitative assessment by participants of the workshop.

Table 2 – Overview of quantitative assessment of statements within scenarios

World in 2040 / Vision statements	Storms	Endgame	Struggling synergies	Opposing views
Increased circularity	Not plausible	Neutral	Neutral	Plausible
Stronger farmers' position in the value chain	Not plausible	Not plausible	Plausible	Plausible
Simplification and digitalisation	Neutral	Not plausible	Plausible	Plausible
		Neutral	Neutral	Neutral
Reduction of strategic dependences and biopesticides	Plausible	Neutral	Not plausible	Plausible
			Neutral	Neutral
Robust risk management and resilient practices	Not plausible	Not plausible	Plausible	Neutral
Sustainable protein production	Neutral	Plausible	Plausible	Very plausible
		Neutral	Neutral	
Bio-based economy and renewables	Not plausible	Not plausible	Plausible	Plausible
GHG reduction	Not plausible	Not plausible	Very plausible	Very plausible
Short food supply chains	Plausible	Not plausible	Not plausible	Plausible
Transparent food labelling	Not plausible	Not plausible	Not plausible	Very plausible
Functional rural areas and public services	Not plausible	Not plausible	Not plausible	Plausible
Reduction of food waste and sustainable consumption	Not plausible	Not plausible	Plausible	Neutral

2.2.2. Increased circularity and Europe's leading role in the bioeconomy

> The transition towards a more sustainable agri-food system could be achieved by adopting a circular economy approach and regenerative agricultural practices, based on policy reforms, investment in infrastructure and technology, and support for education and training programmes. Approaches such as product design for recyclability and reuse, could help reduce food waste and promote the use of food by-products and waste as inputs for other products. Innovation also plays a substantial role. However, companies in the agri-food sector are still in the early stages of implementing circularity (Arru et al, 2022).
>
> Consumer behaviour is another critical factor influencing the transition to circular food systems. Understanding how consumers engage with circular practices and how various stakeholders can collaborate effectively remains a challenge (De Bernardi et al, 2023).
>
> The diversification of rural economies could provide benefits for the sector, through the diversification of production, bioeconomy, and biomass production. Strategic use of energy crops could enhance ecosystem functions, and despite criticism on taking land for food or biodiversity, with careful planning, bioenergy production could coexist with environmental conservation (Baumber, 2016).
>
> Bioeconomy is a crucial component of the European Green Deal and bioeconomy strategy. A sustainable and circular bioeconomy emphasises the importance of transitioning to a climate-neutral economy while preserving the biosphere (M'barek and Wesseler, 2023).

Statement 1: By 2040, increased circularity and Europe's leading role in the bioeconomy market has strengthened the diversification of farmers' value streams and their role in the value chain.

Overall, the participants noted a clear opposition between the pursuit of a transition towards sustainability on the one hand and competition and intensive agriculture on the other. This contrast is expected to become even more pronounced in the future, as the world could face greater challenges such as environmental degradation, resource depletion, and climate change. The key factor influencing the plausibility of this statement is, therefore, whether sustainability and environmental protection will be prioritised in the future, particularly in Europe.

If sustainability and environmental protection are given preference in the future, the statement is likely to perform exceptionally well. This could be the case if agri-tech start-ups focus on circularity and zero waste driving a circular bioeconomy approach (**Opposing views**).

The EU's slow and careful approach to multilateral discussions could lead to increased circularity and a stronger bioeconomy market (**Struggling synergies**). In such a future, the emphasis on sustainability and environmental protection could create an environment where the opposition between sustainability transition and intensive agriculture is more pronounced. The statement would, thus, reflect the challenges and trade-offs that societies and economies would face in the pursuit of a more sustainable future.

However, the validity of the statement might be compromised if there is a strong focus on economic growth and competitiveness with no attention paid to circularity or resource management. Without paying attention to resources (**Endgame**), or in a scenario where global cooperation collapses (**Storms**), this statement's plausibility may be reduced, even if improved collaboration between agricultural industry sectors could push for increased circularity in a resource-scarce world (**Storms**). In such cases, the opposition between sustainability transition and competition/intensive agriculture may be less pronounced, or may even be overshadowed by other factors and challenges.

2.2.3. Farmers' position in the value chain

Statement 2: 'By 2040, farmers' position in the value chain has been strengthened through joining cooperatives. They do not need to sell below cost. The agri–food chain observatory contributes to higher transparency regarding pricing'.

Farmers have a key but complex position in a value chain. They are impacted by consumer needs, product affordability, and current policies – including the need for sustainable practices, as well as market dynamics and concentration. The impacts of climate change that could lead to more extreme weather and more stringent sustainability standards in the future would need further adaptation of the sector. This could ultimately also impact competitiveness.

Global market trends greatly affect the EU food chain. Supply chains can experience disruptions and price fluctuations. Competition from outside the EU and trade agreements might also negatively impact EU farmers and value chains. Therefore, strengthening farmers' resilience to potential shocks across geopolitical, economic, environmental, social and technological areas is crucial for food security. By joining cooperatives, they could reduce costs, increase efficiency and remain competitive (Barling et al, 2022).

EU consumers are increasingly willing to buy sustainable and locally produced food, as well as high quality food, but not everyone can afford this. Relying on local production could advantage EU farmers. Precision agriculture can support farmers in increasing efficiency and reducing costs. Farmers' ability to adapt and innovate might be essential to enhancing their bargaining power and ensuring their resilience in the face of ongoing challenges. For example, digital technologies can help overcome some of the challenges, such as in relation to extreme weather conditions.

To increase fairness in the agri–food sector, the EU's Unfair Trade Practices Directive banned purchasing agricultural products below production costs and boost farmers' bargaining capacities. Proposals for an amending regulation on strengthening farmers' position in the food supply chain and amending the Unfair Trading Practices Directive were published in December 2024.

Overall, the participants emphasised the importance of defining the desired type of production, as this would have significant implications for the future of agriculture and the EU's food systems. They noted that this statement would not be very robust in the majority of the scenarios, suggesting that it may not be a feasible goal for 2040 in several possible future contexts. This lack of robustness highlights the challenges and uncertainties surrounding the future of agriculture, where multiple factors such as climate change, market forces and governance structure will shape the trajectory of value chains.

In certain scenarios, however, the statement could be more plausible. For instance, in scenarios where the EU encourages fair competition, transparency, and social equality (**Struggling synergies, Opposing views**), stronger farmers' cooperatives could emerge, allowing for more collaborative and equitable production systems. Additionally, if the EU governance structure becomes more robust (**Struggling synergies**), this could lead to increased transparency and accountability, creating an environment where defining the type of production desired becomes a more feasible and desirable goal. This could further lead to more sustainable and equitable food systems, where the needs of both farmers and consumers are taken into account.

In scenarios with a strong emphasis on market forces and deregulation, the statement may be less plausible (**Endgame**). In these scenarios, the focus on economic growth and competitiveness could lead to a concentration of power in the hands of private interests, making it difficult for smaller farmers to survive. For example, if Europe were to experience a harsh climate change impact coupled with an increase in artificial food production (**Endgame**), only highly invested farmers could survive, while farmers who own or work on smaller farms would likely disappear.

Furthermore, in scenarios where self-interest and protectionism dominate (**Storms, Endgame**), the statement would likely not be plausible, as the focus would shift towards individual or national interests rather than collaborative and equitable production systems.

2.2.4. Regulatory simplification, digitalisation and automation

Data is growing in amount and availability. Digital technologies can help overcome regulatory burdens by combining data obtained with different tools, such as Copernicus and Galileo. Combining earth-observation satellite data with other data obtained from a farm (e.g. via network sensors, invoices, labelling), can reduce the need for reporting by farmers, as well as contribute to other environmental objectives. However, several connected issues could be challenging and the data integration system should be carefully designed (Poppe et al, 2021).

One of the key issues is limited access to high-speed internet and digital infrastructure, which is delaying the adoption of digital technologies in rural areas. Limited access to data and information can hinder farmers' ability to make informed decisions. Reluctance to use digital technologies, especially among older generations, might be another issue. Without transparency and adequate safeguards for data protection (as the EU General Data Protection Regulation only relates to persons) and resilience to potential cyberattacks, the use of automation could ultimately worsen regulatory complexity and undermine trust in the EU's data-driven simplification agenda. Other challenges include cybersecurity risks and disruptions, the high costs of investing in digital technologies, and technological obsolescence, which can lead to continuous investment in new technologies. Additionally, digital technologies may exacerbate existing social and economic inequalities, particularly in rural areas, widening the gap between digitally literate and illiterate, and disrupting traditional agricultural practices and ways of life.

Statement 3: 'By 2040, the EU has simplified administrative procedures for farmers by gathering data about their farms' work through digital technologies. The integration of AI and satellite data leads to near-total automation of farm reporting'.

The question, reflected upon in the workshop, of whether full automation of the agri-food sector is necessary, is particularly pertinent in the context of Europe's ageing population trend. As the population ages, the workforce in the agricultural sector is likely to decline, leading to a potential shortage of labour. This trend is also reflected in one of the scenarios employed (**Struggling synergies**), where the ageing population presents a significant challenge. In this context, automation could be seen as a solution to mitigate the impact of labour shortages and ensure the continued productivity of the sector. However, the question remains as to whether full automation is the answer, and what the potential consequences of such a shift might be.

The statement is plausible in scenarios where the EU invests heavily in digitalisation and innovation, particularly if these efforts are accompanied by a focus on interoperability. In such scenarios (**Endgame; Struggling synergies**), the EU's investment in digitalisation and innovation could lead to the development of more efficient and automated systems, which could help to address the challenges posed by an ageing population. Interoperability would be crucial to ensuring that different systems and technologies can work together seamlessly, allowing for the free flow of data and information. This could, in turn, enable the development of more precise and efficient agricultural practices, which could help address the sector's future challenges.

However, the statement may be less robust in scenarios where resources are limited or where there is a stronger focus on traditional practices. If global cooperation collapsed and connection issues were a problem, the adoption of automated systems could be obstructed (**Storms**). Furthermore, without adequate safeguards for data protection and cybersecurity, the increased reliance on automation and digitalisation could lead to further erosion of trust among citizens, exacerbating dissatisfaction and undermining citizen trust (**Endgame**).

On the other hand, precision agriculture, which is enabled by automation and digitalisation, could help the sector address future challenges, such as those posed by climate change and environmental degradation (**Storms; Opposing views**).

2.2.5. Reducing strategic dependencies and developing biopesticides

The EU agricultural sector faces resource scarcity, globalisation and complex supply chains, as well as a dependence on non–EU technologies. The sector also struggles with increased competition from non–EU countries. Reducing strategic dependencies in the agri–food sector is, therefore, a multifaceted challenge, particularly in the context of sustainability and competitiveness.

EU farmers and companies might have limited access to global markets, which could impact their ability to compete with other countries. The sector's dependence on international trade agreements creates potential risks of trade wars and instability in global agricultural markets.

Climate change will require significant adaptation and mitigation efforts, including addressing volatile and harsher weather conditions and dealing with new pests and diseases. The EU is also currently dependent on raw materials and fertilisers. Therefore, decreasing this dependency would be important for food security, competitiveness, farmers and sustainability. Farmers could then rely on a stable supply and prices.

Investment in research and development by major agri companies drives the development of alternatives solutions to chemical pesticides (EC, 2022). Biopesticides could lead to more sustainable food systems. As they are mostly based on natural substances, such as microorganisms or plant extracts, they are considered as more environmentally friendly and aligning with sustainability goals. They could therefore improve food safety and consumer protection and contribute to organic farming, as long as they are used responsibly to prevent unwanted outcomes. They could also foster a sustainable approach to pest management, which would allow Europe to maintain competitiveness in the global market (Constantin et al, 2023). However, biopesticides can be less effective and a more expensive alternative to chemical pesticides.

Statement 4: 'By 2040, the EU has reduced its reliance on imported raw materials and fertilisers, and increased domestic production and biopesticides, to reduce strategic dependencies'.

The question of whether it will be possible to fully and exclusively rely on biopesticides in the future is a complex one, with implications for the EU's agricultural sector and its approach to pest management. Biopesticides could offer a potentially more sustainable and environmentally friendly alternative to traditional chemical pesticides. Nevertheless, the feasibility of relying solely on biopesticides depends on various factors, including the EU's priorities, policies, and technological advances.

In scenarios where the EU prioritises self–sufficiency and security, reducing strategic dependencies on external sources, the development and use of biopesticides could become a key component of its agricultural strategy (**Storms, Opposing views**). In these scenarios, increased investment in domestic production and biopesticides could help reduce the EU's dependence on external sources, enhancing its food security and resilience. Furthermore, if the EU focuses on sustainability and environmental protection (**Opposing views**), this could drive the development of domestic production and biopesticides, as these alternatives are often seen as more environmentally friendly.

The statement may be less robust in scenarios with harsher impacts of climate change, where international cooperation in developing novel pesticides and more resilient crops would be needed (**Endgame**). In such a future, the EU may need to rely on a combination of biopesticides and other approaches, including chemical pesticides, to manage the increased pest pressure and crop losses resulting from climate change. The development of more resilient crops and novel pesticides would require international cooperation and knowledge sharing, which could be challenging in a scenario

with more competitive and less collaborative nations. Additionally, if the world is focused on climate action without consideration for other aspects of sustainability, the development of climate-neutral pesticides is more plausible than biopesticides, with potentially negative impacts on biodiversity (**Struggling synergies**). Therefore, while biopesticides could play a significant role in the EU's agricultural sector, it is unlikely that they could be relied upon exclusively.

2.2.6. Risk management and climate resilience

Damage caused to the agri-food system by weather disasters and multiple food crises will be possible in the future, especially related to extreme events caused by climate change (CRFS Alliance, 2024).

Various tools and strategies could be used for a resilient risk management that takes account of the uncertainties and complexities with which the sector might have to deal in the future. Coherence between the EU and national levels, as well as among different policies, is key to increasing resilience. For example, supply chain resilience could be enhanced by fostering collaboration and coordination among stakeholders for information sharing, as well as to ensure mitigation of potential risks.

The use of foresight to look at the agri-food system in a systemic way can guide effective decision-making and identify anticipatory actions, as well as proactive strategies, aiming for a better performing supply chain. Additional preventive strategies, including risk assessment, early-warning systems and diversification of crops, as well as accessible information, can minimise the effect of disaster on the agri-food system.

The EU's agricultural sector can also benefit from the development of climate-resilient agriculture, reducing the impact of climate change on agricultural production (Shanker et al, 2018). This includes climate change adaptation and enhancing food security and sustainable agriculture. Climate-smart technologies, such as precision agriculture and drought-resistant crop varieties can help improve farmers' adaptive capacity and strengthen food systems against climate-related risks (Suri, 2025).

Statement 5: 'By 2040, the EU has established a robust and resilient risk management system for the agri-food sector, including climate-resilient agriculture practices and crisis management tools'.

Establishing climate-resilient agriculture practices is crucial to reducing the need for crisis management in the agricultural sector. By adopting practices that are resilient to the impacts of climate change, such as droughts, floods, and other extreme weather events, farmers and policymakers can minimise the risk of crop failures, livestock losses, and other disruptions to food production. This, in turn, can reduce the need for crisis management and emergency responses, which can be costly and inefficient. The workshop participants agreed that investing in climate-resilient agriculture practices is a proactive approach that can help mitigate the impacts of climate change and ensure a more stable and sustainable food system.

The statement that robust risk management systems have been established, including climate-resilient agriculture practices is plausible in scenarios where the EU prioritises risk management and invests in climate-resilient agricultural practices (**Struggling synergies**). In this scenario, the EU's focus on risk management and investment in climate-resilient practices can help farmers and policymakers anticipate and prepare for climate-related risks, reducing the need for crisis management.

The statement is only partly plausible in scenarios where resources are limited, or the focus is on short-term gains, and global cooperation has collapsed (**Storms**). In such scenarios, there is a lack of funding for climate-resilient practices. This could exacerbate the impacts of climate change, making crisis management strategies necessary.

Having resilient agricultural practices is of particular importance in a future context hit hard by climate change (**Storms, Endgame**). In these scenarios, the frequency and severity of climate-related disasters could have devastating impacts on agriculture, leading to food shortages, price volatility, and social unrest.

In a deregulated world, crisis management may be led by the private sector, with technology-enabled responses playing a key role (**Endgame**). Yet, this approach may not be sufficient to address the scale and complexity of climate-related risks, highlighting the need for a more comprehensive and proactive approach to building resilience in the agricultural sector. Competition from another country or region outside Europe could also lead to unstable prices (**Opposing views**).

2.2.7. Sustainable protein production

It is estimated that by 2050, conventional protein consumption could increase by 57 % for meat and 48 % for dairy. Alternative proteins could account for 11 % of the global protein market by 2035 (EPRS, 2024).

The EU is currently dependent on imported protein, especially for sustaining domestic livestock production. Protein is imported to the EU from a limited number of countries. For example, three quarters of the EU's vegetable protein needs (mostly soybean meal for animal feed), comes from Brazil, the United States, or Argentina. This poses a risk to food security and local agricultural practices. The European Commission has therefore been examining the potential to increase plant protein production in the EU (Jensen et al, 2021).

Novel strategies would need to be put in place to assure protein availability in the EU. This would be important to tackle energy needs and the environmental impact, and to provide substitutes to conventional food and feed. Additionally, four sources of alternative proteins could be envisaged for the future: algae, insects, microbial fermentation and cultured meat (EPRS, 2024).

Alternative proteins could also play a role in the mitigation of GHG emissions. Shifts in dietary patterns towards more plant-based diets, as a part of behavioural shifts, could lead to a diversification in protein sources in the future. Plant-based alternatives and insects for feed provide a potentially substantial opportunity for scaling up (EPRS, 2024).

Statement 6: 'By 2040, the EU has developed a comprehensive plan to address the challenges of protein supply and promote sustainable protein production'.

The performance of this statement is largely dependent on the dietary habits of EU citizens and the EU's level of autonomy in the food chain. A diet that is more focused on plant-based and locally sourced products can reduce the EU's dependence on external sources of protein, making the statement more robust and plausible. In scenarios where the EU prioritises food security, sustainability, and strategic autonomy, the statement is particularly plausible (**Opposing views**). This would lead to increased investment in domestic protein production, reducing the reliance on external sources and enhancing food security. By prioritising sustainability and strategic autonomy, the EU can reduce its dependence on external protein sources and ensure a more secure and sustainable food system.

In some scenarios, the protein supply challenge may be mitigated by technological advancements, such as an increased reliance on artificial food and synthetic protein sources (**Endgame**). For example, the widespread adoption of artificial food and synthetic protein sources could make protein supply a non-issue, as it would no longer be dependent on traditional agricultural production. This could potentially reduce the EU's dependence on external sources of protein, making the statement more plausible. However, this scenario also raises questions about the long-term sustainability and environmental impact of such technologies, and whether they can provide a reliable and equitable source of protein.

In scenarios where sustainability is not prioritised and inter-regional cooperation is lacking, protein supply might be more uncertain and depend on EU-based production (**Storms***)*. In such a world, a lack of investment in sustainable protein production and an absence of international cooperation could exacerbate the protein supply challenge, making the statement less plausible.

Increased investment in sustainable protein production could go hand in hand with the diversification of sources and a decrease in dependencies on external sources (**Struggling synergies**). This, in turn, could enhance the EU's food security and sustainability, making the statement more robust and plausible.

2.2.8. Bio-based economy

Statement 7: By 2040, the EU has developed a bio-based economy and increased the use of renewable energy sources in agriculture and forestry.

The future of energy production and consumption is a critical factor in determining the plausibility of the above statement. The type of energy sources that will be used will have a significant impact on the environment, climate change, and sustainability.

> The agri-food sector's pressure on natural resources, including increased consumption and land-use changes, may lead to further environmental degradation and loss of biodiversity. Preserving and improving animal welfare might present another challenge.
>
> If not managed in a sustainable way, the biomass production on a mass scale could have negative environmental impacts (e.g. deforestation, water pollution, loss of biodiversity). While promising, the reliance on biomass for energy raises concerns regarding sustainability, carbon neutrality, and economic viability, where avoiding negative environmental impacts is important (Ignat et al, 2024). For the bio-based economy, investment in new infrastructure (e.g. transportation, storage, processing facilities) is also necessary.
>
> The bio-based economy can create new market opportunities for farmers and industries and support economic growth and competitiveness (Fritsche et al, 2021). Its implementation can drive innovation and technological development, improving the efficiency and sustainability of biomass production and processing. The use of biomass can support circular economy approaches, reduce waste and increase the use of by-products and waste as inputs for other products. Balancing the production of bioenergy with food security and ecosystem services is necessary.
>
> Through the self-sufficiency seen in biomass management, biomass can potentially play a significant role in the EU's energy transition towards sustainable practices (Ignat et al, 2024). A shift towards renewable energy sources can enhance energy security and contribute to rural development by creating new economic opportunities.
>
> The new EU bioeconomy strategy is planned for adoption by the end of 2025. It will focus on maintaining the EU's bioeconomy leadership, supporting innovation including start-ups and new business models, and increasing circularity, decarbonisation and competitiveness (European Commission, 2025).

If the EU prioritises climate change mitigation, sustainability, and environmental protection, and becomes a global leader in energy transitions, the statement is more plausible (**Opposing views**). The EU would then lead the world on energy transitions and its focus on renewable energy sources and reducing greenhouse gas emissions would lead to a significant reduction in the environmental impact of energy production and consumption.

The statement is also more plausible in scenarios where there is an increased investment in renewable energy sources (**Struggling synergies**). In this scenario, the EU's investment in renewable energy sources, such as solar and wind power, would lead to a reduction in the reliance on fossil fuels and a decrease in greenhouse gas emissions. This, in turn, would mean that the EU would be

well on its way to achieving a sustainable and environmentally friendly energy system. Furthermore, the EU's leadership in energy transitions and increased international collaboration would also encourage other countries to follow suit, leading to a global reduction in greenhouse gas emissions and a more sustainable future.

The statement performs less well in scenarios with a relatively strong focus on fossil fuels (**Endgame**). In this scenario, a continued reliance on fossil fuels would lead to increased greenhouse gas emissions and a significant environmental impact. Additionally, if there is no funding available for renewable energy sources, the statement may not be plausible at all (**Storms**). A lack of investment in renewable energy sources would hinder the transition to a sustainable energy system, and the EU would continue to rely on fossil fuels, leading to increased environmental degradation and climate change. In such a future, the EU's energy system would be less sustainable and more environmentally harmful.

2.2.9. Greenhouse gas reduction

Agriculture significantly contributes to GHG emissions, with animal production being a major contributor compared to plant production (Pondel, 2019). The EU agricultural sector's dependence on non-renewable energy sources also poses a risk to the environment and to the acceleration of climate change (EC, 2024). Digital technologies may increase energy consumption and greenhouse gas emissions, contributing to climate change (Barabanova and Krzysztofowicz, 2023; EC, 2024, FAO, 2022).

Another key challenge is farmers' awareness and willingness to adopt new practices that could reduce emissions. This lack of awareness often leads to a reluctance to implement the changes needed (Tzemi and Breen, 2019). Farmers and agricultural workers may also have limited access to sustainable and environmentally friendly agricultural practices and technologies, which hampers their ability to reduce environmental impact.

Opportunities for reducing emissions lie in the implementation of innovative agricultural practices, such as carbon farming strategies. Overall, they could enhance the efficiency of the agricultural sector while reducing its environmental impact. These practices, which include cover cropping, reduced tillage and compost application, have been shown to enhance sustainability in organic vegetable production while mitigating GHG emissions (Avasiloaiei, 2023). Precision agriculture and livestock farming technologies are promising technologies for reducing emissions – for instance, in beef production. Organic farming also leads to a decrease in greenhouse gas emissions.

Renewable energy sources in rural regions could reduce dependence on fossil fuels towards more sustainable energy (Bock and Krzysztofowicz, 2021). By applying new technologies and innovation, the sector could contribute to the EU energy mix through green hydrogen, or ocean-based energy storage, for example (Farinha et al, 2023).

Statement 8: By 2040, the EU's agricultural sector has achieved a reduction in greenhouse gas emissions while maintaining food security and increasing sustainable agriculture practices.

Societal consensus is essential to achieving a significant reduction in greenhouse gas emissions and transitioning to a more sustainable food system. This would need to be built across stakeholders, including farmers, consumers, policymakers and industry leaders, to ensure that everyone is working towards a common goal.

The statement is plausible in scenarios where the EU prioritises sustainability and environmental protection, as well as food security (**Opposing views**). A comprehensive climate strategy for agriculture and policies that support sustainable practices, increased funding for RandI and providing farmers with knowledge and skills to adopt these practices and reduce their environmental impact could lead to a broader societal consensus on the need to reduce greenhouse gas emissions and adopt more sustainable practices in the agricultural sector.

However, the statement may be less plausible in scenarios where sustainable practices and greenhouse gas reduction are not a priority, despite technological advancement (**Storms, Endgame**). Here, the focus on short-term economic gains and the lack of attention paid to environmental concerns could hinder the development of a societal agreement on the need for sustainable practices. This could be further aggravated by a lack of international cooperation and an emphasis on national interests. In such scenarios, the transition to a more sustainable food system would also be difficult to achieve.

The statement is especially plausible in scenarios where zero-carbon technologies are introduced, driven by a global greenhouse gas emission trading system that would act as one of the main pillars of economic growth (**Struggling synergies**). This would create a favourable environment for the development of sustainable practices in the agricultural sector. The introduction of zero-carbon technologies would also drive innovation and create new economic opportunities, making the transition to a more sustainable food system more feasible and attractive to stakeholders. As a result, the EU would be more likely to achieve its sustainability and environmental protection goals.

2.2.10. Food supply chains

A growing world population along with increasing urbanisation means that future food demand will increase between 35 % and 56 % between 2010 and 2050 (Van Dijk et al, 2021). Affordability of healthy food and diets might become an even bigger challenge with the increasing impacts of climate change and other factors (EC, 2020; 2024). For example, potential conflicts and wars can disrupt the agri-food sector as well as food supply chains, whose fragility was evident during the COVID-19 pandemic. The cost-efficiency advantages of global supply chains often overshadow the benefits of local systems (Pop et al, 2019).

The EU's potential leadership in sustainable and organic agriculture is an important aspect of the sector's development and can provide impetus. Shorter food chains are a main pillar of the 'Farm to Fork' strategy. In a summary of the European Commission's public consultation conducted with a scope to design a policy initiative for a sustainable food system, a large majority of respondents agreed that the EU food system has to become more sustainable in order to resist possible future challenges. This includes taking an EU-wide approach and involving a range of stakeholders.

The development of more sustainable and equitable food systems includes the development of new agricultural business models and services, thus creating new opportunities for farmers and agricultural workers. Short food supply chains are recognised for their potential contribution to social sustainability, as evidenced by strong agreement among participants in several studies regarding their social benefits (Vitterso et al, 2019).

Additionally, since COVID-19 pandemics, demand has increased for consumption of local and seasonal products (Kalantaryan et al, 2021). This aligns with higher environmental and social standards. Citizens are interested in consuming fresh and healthy as well as organically farmed food. In this context, shorter supply chains are again key to responding to such demands. A direct sales mode, including via online platforms, can shorten value chains, improve transparency and provide a more direct connection and sales between a producer and a consumer, which also reduces their dependence on intermediaries. However, the affordability of these products needs to be considered, as insufficient income still represents the main barrier to a healthy diet, complemented by a need for nutritional education (Penne and Goedeme, 2021).

Statement 9: In 2040, short food supply chains and local and seasonal products are a priority in the EU.

This statement appears to be more plausible across multiple possible futures, suggesting that it has a certain degree of robustness and adaptability. This is particularly evident in scenarios where the EU prioritises local development and a diversity of models adapted to local circumstances

(**Opposing views, Storms**). This would lead to a more decentralised and resilient food system, where local production and consumption are valued and attract investment, with a special support for smaller farms. In such scenarios, it would be more likely that Europeans would rely on their own production and local food systems, but how many people would acknowledge the quality food and could afford to buy it would remain questionable.

In a regionalised world with conflicts, the statement is particularly plausible (**Storms**). In this scenario, Europeans would need to rely on their own production because there would be no other choice due to the breakdown of global trade and an inability to import food from other regions. This would lead to a greater emphasis on local food production and self-sufficiency. Additionally, a lack of global cooperation and a focus on regionalisation would also lead to a greater emphasis on local development and diversity.

However, the statement may work less well in scenarios with a strong focus on globalisation, consolidation of the food industry, and large-scale production and expanding trade (**Endgame, Struggling synergies**). In these scenarios, the emphasis on scale and trade would lead to a more centralised and industrialised food system, where local production and consumption are less valued and supported. Here, it would be less likely that Europe would rely solely on its own production and local food systems. Instead, large-scale production and trade would lead to a more homogeneous and globalised food system, rather than a diverse and localised one.

2.2.11. Food labelling

More reliable and consistent food labelling could contribute to transparency and protect consumers by providing more accurate information. With the increasing trend for consuming organically grown food, this could support sustainable and healthy choices.

Food labelling presents several challenges. Tackling label reliability, misleading claims and a lack of trustworthy information for consumers is key. Despite the EU's consumer protection law, reliable food labelling will remain important in future, especially in relation to sustainability.

The proposed revision of the Regulation on Food Information to Consumers could lead to information that is more accurate and could help consumers make food choices more easily, including sustainable choices. Labelling would provide more information to consumers, about nutritional as well as the climate and environmental aspects of food products. However, no proposal has yet been submitted for the revision of the regulation or for sustainable labelling.

Statement 10: 'By 2040, the EU has created a fair and transparent food-labelling system, with clear and accurate information for consumers and support for sustainable food choices'.

Endorsing behavioural change and branding in the context of sustainable food systems is necessary for the success of the above statement. This suggests a recognition of the need for a change to consumer behaviour and in the uptake of sustainable food choices.

The statement is therefore more plausible in scenarios where the EU prioritises consumer protection and transparency, as it would lead to policies and regulations that underpin clear labelling, honest marketing, and sustainable production practices (**Opposing views**). This would create an environment where consumers are empowered to make informed choices and where sustainable food options are valued.

In contrast, the statement would be less plausible in scenarios where no care is taken for consumers or the focus is on deregulation (**Endgame, Storms**). In these scenarios, a lack of regulation and oversight would allow misleading marketing and labelling practices, making it difficult for consumers

to make informed choices. Additionally, the focus on deregulation would prioritise private entities' economic interests over consumer protection, leading to a lack of transparency and accountability in the food industry. This would create an environment where sustainable food options are not prioritised.

The statement would not be plausible in scenarios where there is no transparent labelling, the agricultural industry projects sustainability to consumers, with 'greenwashing' that dominates the agenda (**Struggling synergies**). In this scenario, a lack of transparency and accountability would allow misleading marketing and labelling practices, making it difficult for consumers to distinguish between genuine sustainable food options and those that are simply 'greenwashed'. This would create a lack of trust among consumers, which would impede behavioural change and branding of sustainable food options. Furthermore, the agricultural industry's projection of sustainability would be seen as self-serving and lacking in credibility, undermining efforts to support sustainable food choices.

2.2.12. Functional rural areas and public services

The EU agricultural sector faces numerous challenges, including workforce attraction and retention, sustainability, environmental protection, access to public services, mental health and well-being. According to some authors, the sector faces social inequality and injustice, particularly for women in farming, despite the current CAP's promotion of gender equality (Diamanti and Duncan, 2023). Additionally, increased urbanisation and a decreased rural population lead to a decline in rural communities. A lack of access to education and training opportunities for young farmers and rural communities also hinders their ability to adapt to changing circumstances (Serban and Braziene, 2021). Support services for farmers and rural communities are often lacking and stigma surrounding mental health issues persists, especially in smaller and rural communities (European Commission, 2023c). However, farming is a high-pressure profession and rural communities can be socially isolated, which can exacerbate feelings of loneliness and disconnection.

Rural areas have the potential to be revitalised, preserving their natural capital, stimulating their economic and social activities, and maintaining their unique identity. Sustainable agriculture practices can be adopted, while reducing environmental impacts and increasing the wellbeing of farmers and rural communities.

Education and capacity building for young farmers and rural communities are key to enhancing their skills and knowledge, as well as their access to other public services. Furthermore, increased social inclusion and cohesion through different tools, including digital technologies, can help rural development and community engagement.

Statement 11: In 2040, the EU has functional rural areas and improved access to services such as healthcare, education, and digital connectivity.

The statement in question is plausible if the EU continues to prioritise rural development and social cohesion by 2040. This suggests that the EU's policies and initiatives would need to focus on supporting rural communities and ensuring that the benefits of development are shared equitably among all members of society. In this way, rural development and social cohesion would be seen as essential components of the EU's overall development strategy. However, it is worth noting that this statement is not seen as plausible across the majority of scenarios, indicating that significant challenges and uncertainties need to be addressed.

The statement is particularly plausible in a scenario where intensive farming is abandoned and small farms thrive (**Opposing views**). Here, the EU's focus on rural development and social cohesion would lead to a more equitable and sustainable food system, where small farms are empowered and supported to produce high-quality, locally sourced food. Farmers and rural areas would have better

access to public services that prioritise their needs and wellbeing. This would not only contribute to the preservation of rural communities, but also to the protection of the environment. Thriving small farms would lead to a more diverse and resilient food system, where local production and consumption are valued and supported.

In contrast, the statement would perform less well in scenarios with limited resources, where big agri-food companies flourish and a focus on urbanisation leads to farmers leaving villages because farmland has become unaffordable (**Struggling synergies, Endgame**). It would also not perform so well if public services are slow to respond to farmers' and rural communities' needs (**Struggling synergies**) or if access was unequal or occasionally non-existent (**Endgame**).

The statement would not be plausible in scenarios where there is a lack of solidarity and social cohesion (**Storms**). In this scenario, a breakdown in social cohesion, and a lack of solidarity and care for vulnerable communities, including the rural ones, would lead to a fragmented and unequal society, where rural communities are neglected and marginalised. The absence of social cohesion would also undermine the EU's ability to support rural development and small farms, leading to big agricultural companies taking a dominant position, and the decline of rural communities. Furthermore, the focus on urbanisation and the abandoning of rural areas would exacerbate the challenges faced by rural communities, making it even more difficult to back social cohesion and small farms. In such scenarios, the EU's rural development and social cohesion policies would need to be significantly revised to address the underlying challenges and stimulate a more equitable and sustainable food system.

2.2.13. Food waste and sustainable consumption

The current food system is characterised by inefficiencies throughout the supply chain, leading to significant food losses during production, processing, transportation, and storage. The food-waste scale, with around 1.3 billion tons/year of food for human consumption being lost or wasted globally, is challenging (Villarino et al, 2017).

The EU has the potential to lead in sustainable and organic agriculture and reduce environmental impact with the development of more inclusive and equitable agricultural policies and food systems, ensuring everyone has access to healthy and nutritious food. Increased global cooperation in agriculture could include data sharing, research collaboration, and harmonisation of standards. Innovation in agriculture could support further sustainable development and reduce environmental impacts.

It is difficult to change consumer behaviour in this area. The reduction of food waste is not a priority in existing policies, and this might create barriers to sustainable consumption practices. Therefore, legislative changes and collaboration across sectors are needed to foster an environment favourable to reducing food waste and achieving a circular economy (Urugo et al, 2024). Addressing the demand side by promoting healthy and sustainable diets is crucial, along with fostering a culture of sustainability. This approach could not only reduce food waste but also encourage responsible consumption patterns that align with sustainability goals (Arrieta and Aguiar, 2023). Integrating food waste management with sustainable agricultural practices can enhance food security and sustainability (Wanni et al, 2024).

Statement 12: By 2040, the EU has reduced food waste and increased sustainable consumption patterns.

The statement in question, although desirable, does not seem very plausible across the scenarios. The feasibility of this statement would largely depend on who stays or leaves farms, highlighting the importance of the agricultural workforce in achieving sustainable practices. The demographics of the farming population, including their age, skills, and motivation, would play a significant role in determining the adoption of sustainable practices. If younger, more educated, and 'tech-savvy' farmers are more likely to stay in the profession, they may be more inclined to adopt sustainable

practices. On the other hand, if older farmers are more likely to leave the profession, their knowledge and experience may be lost, making it more challenging to achieve sustainable practices.

The statement is perceived as more sustainable in scenarios that prioritise climate action and food waste reduction (**Struggling synergies**). In this scenario, the focus on climate action could drive food waste reduction, as both consumers and producers become more aware of the environmental impacts of food production and consumption. The emphasis on climate action would also lead to the adoption of more sustainable agricultural practices, such as organic farming, permaculture, and regenerative agriculture, which highlight soil health, biodiversity, and efficient water use. Additionally, the focus on sustainability could also drive food waste reduction in scenarios where the EU prioritises sustainability and environmental protection (**Opposing views**). In such a world, the reduction of food waste would be seen as a key strategy for achieving sustainability and reducing the environmental impacts of food production and consumption.

However, the statement is less plausible in scenarios with a strong focus on consumerism and where food security is questionable, leading to a lack of choice. The prioritisation of economic growth and consumerism would lead to producing cheap and abundant food, rather than sustainable and environmentally friendly food (**Endgame, Storms**). A lack of food security would make it difficult for consumers to make choices about the food they eat, as they would be more focused on accessing enough food to meet their basic needs (**Storms**). Nevertheless, the increase in synthetic food consumption could lead to more sustainable practices to some extent, including the lowering of GHG emissions and better land-use efficiency (**Endgame**). The adoption of synthetic food could reduce pressure on traditional agriculture and the environmental impacts of food production, but the quality could be questionable.

3. Conclusion and policy considerations

We live in uncertain and turbulent times. Foresight starts with a premise that the future is inherently unpredictable and that we might face various uncertainties along the way. To build resilience in the face of these uncertainties, various foresight methods and tools have been developed. By applying wind-tunnelling to the Commission's vision for agriculture and food, we can strengthen its resilience and better equip it to withstand a range of possible future scenarios. The results in Table 3 show none of the statements will be fully plausible in all of the possible futures taken into account.

In the **Storms** scenario, the world is characterised by a collapse of global cooperation, scarcity, and hostility between blocks. The performance of the statements based on the Commission's vision in this scenario is mixed and the scenario presents significant challenges to achieving the vision. Statements related to sustainability, such as increased circularity and reduced greenhouse gas emissions, are less plausible due to the exclusive focus on strategic autonomy and self-sufficiency. In contrast, statements related to food security, such as supporting local food systems and reducing dependence on external sources, are more plausible as they align better with the scenario's emphasis on autonomy.

In the **Endgame** scenario, economic growth and competitiveness are the primary drivers, leading to a world with increased inequality and environmental degradation. The performance of the vision statements in this scenario is generally poor and challenging. Statements related to sustainability, such as reduced greenhouse gas emissions and increased circularity, are less plausible as sustainability is not a focus. The statement on backing local food systems is also less plausible as this would not make Europe competitive in globalised markets. In contrast, statements related to technological innovation, such as precision agriculture and digitalisation, are more plausible as they

can contribute to increased efficiency and productivity. However, these statements may not address the social and environmental challenges associated with this scenario.

In the **Struggling synergies** scenario, there is a strong focus on climate action and technological innovation, but other sustainability aspects are neglected. The performance of the vision statements in this scenario is mixed. The scenario presents opportunities for achieving the vision statements related to sustainability and climate action, but policymakers must also address the associated social challenges. Statements related to sustainability, such as reduced greenhouse gas emissions and increased circularity, are more plausible due to a focus on climate change mitigation. The statement on promoting local food systems is mixed, as on one hand it can contribute to reducing carbon emissions and enhancing sustainable agriculture, but on the other, it might not be a priority for globalised markets. Statements related to social justice, such as improving farmers' income and promoting fair-trade practices, are less plausible due to the increased social inequalities in this scenario. The statement on functional rural areas and improved access to services is more plausible, as it can contribute to reducing social inequalities and helping rural development.

In the **Opposing views** scenario, there is a strong focus on social equality and environmental sustainability in a regenerative alliance, with environmentally conscious elites leading the way. The performance of the vision statements in this scenario is generally good and this presents significant opportunities for the vision's success. Statements related to sustainability, such as reduced greenhouse gas emissions and increased circularity, are more plausible due to the focus on environmental sustainability. The statement on supporting local food systems is also more plausible as it can contribute to reducing carbon emissions and encouraging sustainable agriculture. The statement related to improving farmers' income and stimulating fair trade practices, are also plausible. The statement on functional rural areas and improved access to services is plausible as it can contribute to reducing social inequalities and investing in rural development.

Looking across the four scenarios, elements of the vision that relate to sustainable protein sources, reduced strategic dependencies and simplification and digitalisation seem to be the most robust and work in the majority of scenarios. On the other hand, food labelling and functioning rural areas would need to be made more robust in order to work better across a range of different futures.

As this foresight exercise has shown, for the vision to be a success, policies need to be aligned and coordinated to avoid contradictions and to take a holistic approach to sustainable agriculture and food systems. Although all vision statements are desirable, as a result of the different challenges and policy areas that impact agriculture and food, some might not be successful.

Overall, the performance of the vision is not straightforward. The 'wind-tunnelling' process therefore revealed that the potential impact of diverse contextual environments outside policymakers' direct influence was insufficiently considered. It also demonstrated the need for stronger policy coherence and coordination to address the complex challenges (e.g. climate change, social inequalities, environmental degradation) across different sectors, including agricultural, environmental, and social policies. Greater coherence among policies and anticipatory governance in policymaking is therefore necessary.

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The European Commission's vision for agriculture and food aims to ensure the agricultural and food sector's long-term competitiveness and sustainability. This study uses foresight methodology to future-proof the Commission's vision and highlights the need for greater policy coherence and better coordination to address complex challenges such as climate change and social inequalities. Such challenges require a proactive and holistic approach from EU policymakers, and achieving the vision will depend on consideration of possible future contexts.

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