KPMG

# Reimagining global food system resilience

**Enhancing food security through broad, cross-sector collaboration**

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# Contents

# Introduction

The critical role food plays in the effective functioning of society is a well-researched and documented topic — from the importance of a nutritious diet on public health and public finances, the social cohesion around meals, the soft power of culinary influence, all the way to the devastating impacts of poor nutrition on victims of conflicts and political instability resulting from access to food.

Discussions around supplying nutrition to the world's population have tended to largely be reduced to the role of farmers, processors, and retailers, rather than being recognized holistically as one of the fundamental platforms on which society is built. The food system impacts and shapes outcomes for every person and every organization on the planet.

One of the lasting impacts of the COVID-19 pandemic is that it reconnected a large population of food secure people to the critical role food plays in their lives. For many around the world who had been comfortably able to access food, facing empty shelves and shortages as production disruption and supply chain failure highlighted fragilities that have been progressively built into global food systems that they were largely oblivious to. For those already facing food insecurity, their everyday challenges have been further exacerbated.

This shock continues to reverberate today around the world as governments find themselves having to focus on the resilience of their national food supplies. Whether it is as a grower, a processor, a funder, a supplier, an insurer, a transporter, a technologist, or a consumer, the influence of the food system is pervasive. *However, the systems we rely on have reached a critical juncture facing a series of growing challenges:*

- **Environmental degradation, climate change, and biodiversity loss** threaten the natural resources upon which food production depends.
- **Geopolitical shifts and tensions are destabilizing trade routes and supply chains,** while highlighting the consequences inequitable food access can have on social cohesion.
- **Energy shortages and rising costs** highlight the need to explore interactions between food and energy production to find solutions that lift the resilience of both systems.
- **Non communicable diseases, like obesity and diabetes,** are placing pressure on public health systems and raising the focus on the quality of nutrition food systems deliver.

Food systems are so important to the effective functioning of society that it is unreasonable to expect their transformation to be solely left to farmers and their supply chain partners, many of which are at best marginally profitable.

We recognize much valuable work has already been done exploring future pathways for global food systems and are not looking to repeat these important contributions.

KPMG's hypothesis is that resilient food systems are founded on broad collaborations rather than being left solely to farmers and food companies. Resilient food systems enable sufficient, affordable and nutritious food to be sustainably grown (from both an economic and environmental perspective) to meet society's needs.

This requires collaboration that involves not only traditional food sector participants, but organizations from across the economy that historically would not have spent much time thinking about the role they play in the food system. We believe the future lies in radical collaborations where participants from sectors as diverse as energy, healthcare, finance, technology, construction and infrastructure contribute as equal partners with traditional food sector participants and government in solving the challenges that will unleash resilient food systems that are positive for the environment, for communities and for all of those participating in the value chain.

This report has been designed for C-suite business leaders across all sectors -both directly and indirectly connected to the food system -offering insight and inspiration to help them understand and embrace their role in driving transformational change.

We begin by outlining the scale and complexity of the global food system, then examine the key forces driving its transformation — technological innovation, environmental pressures, and evolving consumer and societal expectations. We close by encouraging business leaders to consider how these dynamics intersect with their strategic priorities, and where proactive engagement in food system transformation could create long-term value for their organization and stakeholders.

Every person and organization on the planet is inextricably linked to food systems. Whether it is as a grower, a processor, a funder, a supplier, an insurer, a transporter, a technologist, or a consumer, food plays a critical role in the daily lives of every person on the planet.

**Ian Proudfoot**
Head of Global Agribusiness
KPMG in New Zealand

# A snapshot on the current global food system

## Hunger and food insecurity:

Over **820 million** people experience hunger and food insecurity.

Reducing food waste by less than **25%** could feed the world.

Almost **30%** of food produced is wasted, equivalent to **1.3 billion** tons annually.

## Land and population:

Since 1985, the world has lost nearly **180 million** hectares of arable land, shrinking from 1.4 billion hectares to 1.22 billion hectares by 2020.

**By 2050, the world needs to:**

- Feed almost 10 billion people
- Accommodate over 2.5 billion new urban residents
- Meet net-zero energy goals.

## Health risks:

**Obesity** **Diabetes** **Malnutrition**

are the leading diet-related global health risks, costing economies an estimated US$3.5 trillion annually.

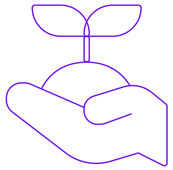
Unsafe food causes illness in an estimated **600 million** people annually.

## Environmental impact:

- Agriculture emits over 6 billion metric tons of $CO_2$ equivalent annually and could reach 9 billion by 2050.
- Over **50%** of the world's population faces seasonal or chronic water shortages.
- Agriculture is responsible for **80%** of global deforestation, **70%** of freshwater withdrawals, and nearly 1/3 of all greenhouse gas emissions.
- Extreme weather events cause an estimated **US$700 billion** in annual damages.
- **74%** of agriculture and retail sector respondents say sustainable land is a critical priority.
- More than **70%** of respondents ranked climate resilience and adaptation as critical to the future of the food system.

## Farmer well-being:

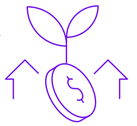
- Farmer suicide rates almost ubiquitously exceed national averages
- Financial pressure, volatile markets, rising costs, and regulatory burdens contribute to mental health challenges.
- Barriers to transferring farms to new generations



## Economic impact:

Global food prices have risen at rates exceeding general inflation in the past **3 years**

Sustainable investment is projected to reach **US$53 trillion** by 2025.



Agricultural **capital flows** remain geographically concentrated

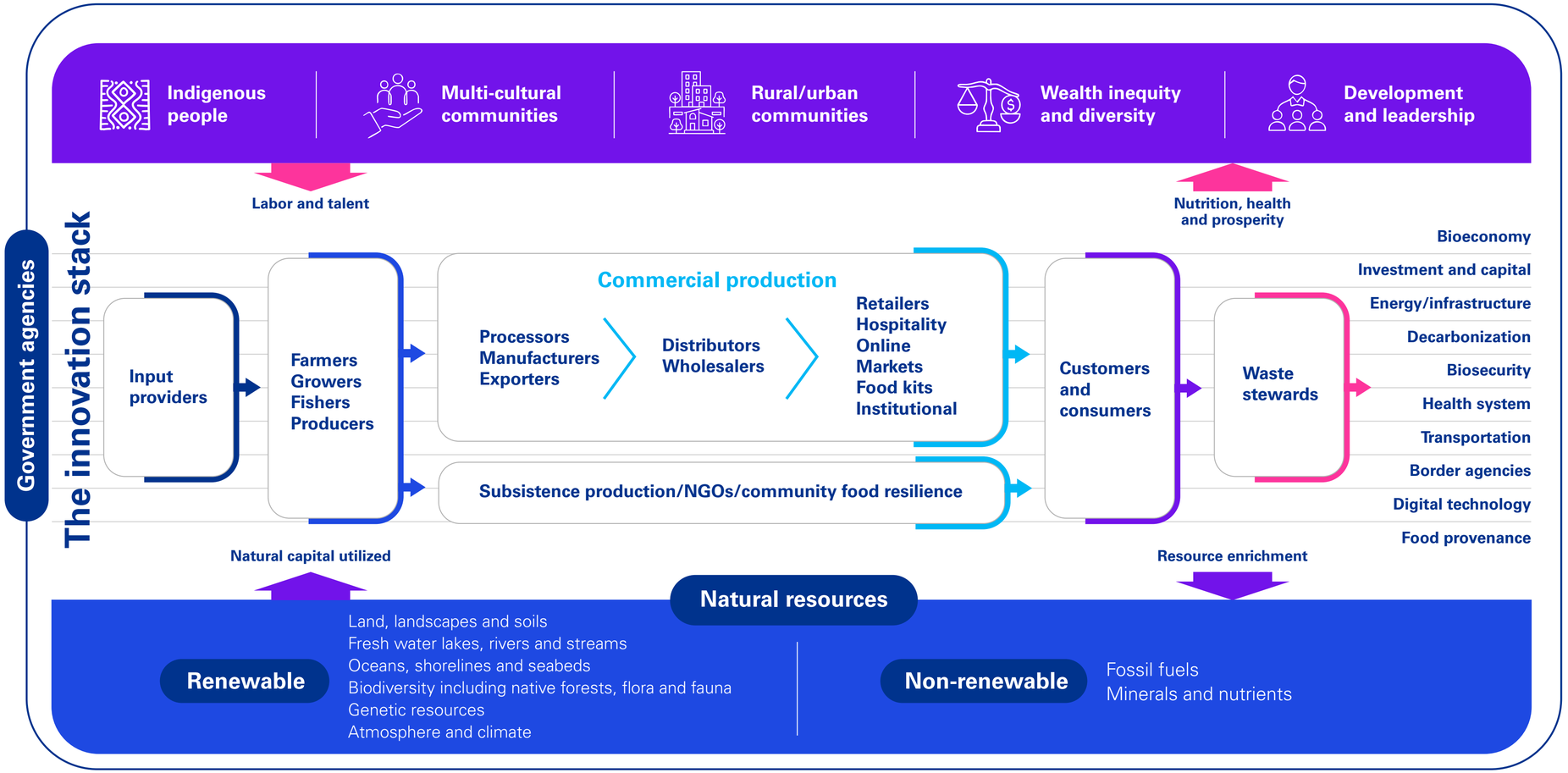
# Part one: Anatomy of today's food system

## What is the food system?

The food system is a dynamic and complex network that does far more than supply what ends up on our plates. It underpins energy and productivity, supports health through nutrition, and relies on agriculture, horticulture, and aquaculture working in alignment with nature. Every aspect of it connects us to the soil, water, air, oceans, and ecosystems that sustain life on the planet.

The food system holds the power to regenerate the earth, uplift communities, and transform industries, offering a profound opportunity to nurture a healthier, more resilient world. Yet the system faces multiple challenges that threaten to undermine the progress achieved by previous generations.

## What is involved in a food system?

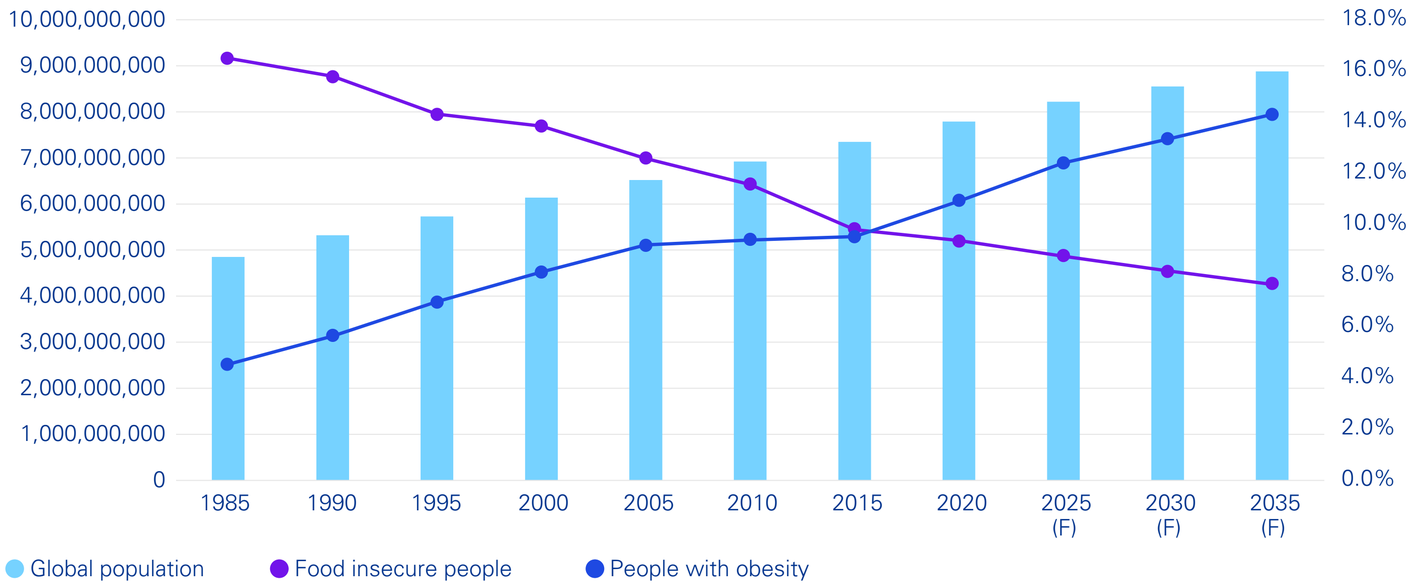


As the global population has grown and its food demands have evolved the food system has grown, enabling it to cultivate, process, and distribute ever greater quantities of food — becoming ever more efficient and effective at delivering increased yields to meet the evolving demands of diverse consumers.

While never having succeeded in feeding the entire population, advancements in science and technology, supply chains, and business models have shaped a web of collaborative connections that has seen global food insecurity consistently decrease and the total number of people fed consistently increase.

However, regional, national, and global conversations have become increasingly disconnected from the land and people that produce our food. Despite the recent introduction of reference to the origin of certain products as food companies recognize that this is a growing expectation from consumers; the conversations that shape our food system happen in the middle of cities, far from the fields and the passionate people that work the land growing food for their living. This is happening to such an extent that many farmers feel that many of the decision makers have never left their own footprints on the most fundamental part of our food system — the farm.

## Figure 1: The shifting pressure of the global food system




Source: KPMG analysis

Beneath the global label of "agriculture" lies a strikingly diverse set of farm systems — ranging from subsistence plots under one hectare to mega-enterprises spanning hundreds of thousands hectares. From orchards to broad acre cropping, plantations to pastoral farms, vineyards to aquaculture and everything in between, there is no such thing as a typical farm. This diversity isn't just statistical; it defines how nations produce, who benefits, and how vulnerable consumers are to shocks.

At one end, over 500 million smallholder farms in countries like Peru, India, and sub-Saharan Africa operate on land parcels often smaller than a football field. These farms are low-input, high-labor systems that feed families and the communities in close proximity, provide a buffer against urban food insecurity, and form the social backbone of rural economies. Yet they operate with minimal safety nets and are increasingly exposed to climate volatility.

At the other end, highly mechanized, capital-intensive farms in Australia, Argentina, Ukraine, and the US dominate export markets and supply huge volumes of global staples such as wheat, corn, and soy. Some of these farms exceed 100,000 hectares, are optimized for efficiency but also deeply intertwined with global commodity markets, making them both powerful and exposed. In common with the smallholder farms they are increasingly vulnerable to climate volatility.

Yield gaps further illustrate the dichotomy. The most productive nations produce 3-4x more production per hectare than the least. Even within countries, yield and income disparities are stark: in Brazil, the smallest 80 percent of farms occupy just 13 percent of land, while the largest 0.3 percent utilize over 30 percent of agricultural land.

This heterogeneity isn't a liability — it's a strategic asset if leveraged with intent. Future food system resilience will not be achieved through uniformity but through adaptability. Small farms offer agility, local nutrition, and ecosystem services. Large farms deliver scale, innovation, and global supply. The challenge is to evolve business models, policies, finance, and innovation systems that recognize this duality, investing in tailored pathways that strengthen resilience across the spectrum of farm types, geographies, and roles in the food web.

Despite significant disparities in what constitutes a farm globally, an unfortunate commonality is the surging mental health crisis facing the world's rural communities, which is resulting in the level of farmer suicide almost ubiquitously exceeding national averages.[1]

The same people who spend their livelihood providing nutrition that sustains our communities and economies often face a stark imbalance between the risks they carry and the rewards they receive. While some farmers benefit from subsidies or policy support, many still operate under intense financial pressure, subject to volatile markets, rising costs, regulatory burden, and shifting public expectations. Despite being the crucial foundation to the food system, they frequently capture only a small fraction of the value created along the supply chain.

Amongst this, farmers face conflicting messages from Governments, NGOs, suppliers and input providers, and the public.

It should be obvious, that without farmers, we will not have food. Yet the myriad of challenges they face (climate changes, environmental regulation, workforce availability, pressure for low food prices amongst others) continue to build, without recognition that many are near, or even past, the breaking point.

A future food system will need to be a farmer-first food system, and this should be reflected in all decision making.

Delivering an environment in which farmers can not only survive, but thrive — requires acknowledgment of the critical role they play in the food system together with consistency of messaging and regulation, so they're able to meet their financial needs, comply with the law, and retain a social license to operate.

Parallel to the operating environment, is exploring how the tools, education and finance can be provided to deliver clear pathways that will retain farmers on their land, and empower them to transition towards more resilient, innovative, regenerative production.

A re-orientation of the food system to recognize the critical role that farmers play in food resilience is an important step to the broader acknowledgement of the food systems integral role in the health of people and the planet.

Across the globe, there are over

**500 million**

farms that are smaller than a football field. In contrast, some farms in other parts of the world span more than **100,000 hectares.**

[1] Sowing the seeds of care, Zero Suicide Alliance, 2021

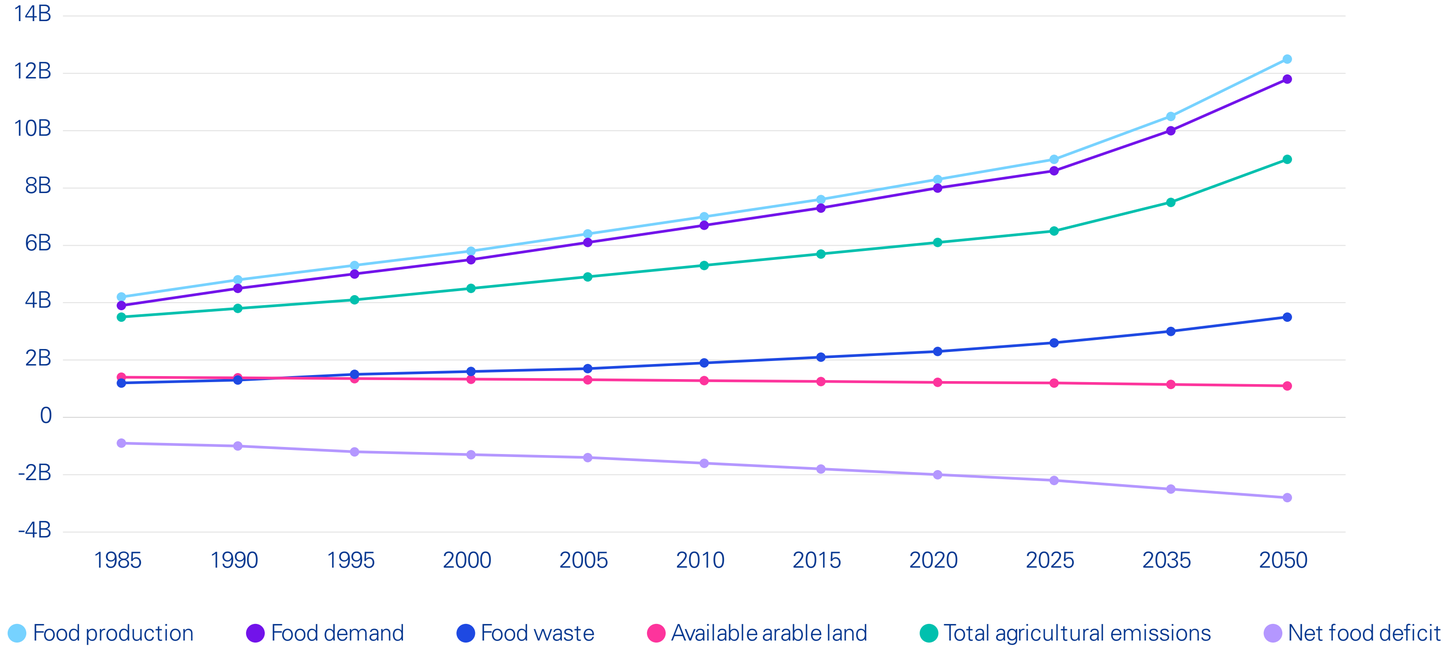
## Outcomes of the food system

The global food system, despite feeding more people than ever before, is increasingly recognized as a driver of systemic failure — accelerating environmental degradation, worsening resource scarcity, and contributing to health crises and geopolitical instability. What should be a source of nourishment and stability has instead become a catalyst for economic, environmental, and social breakdown. Diet-related diseases — including obesity, diabetes, and malnutrition-are now leading global health risks, costing economies an estimated US$3.5 trillion annually.[2] In Sub-Saharan Africa, 45 percent of childhood deaths are linked to malnutrition,[3] while in wealthier nations, food-related illnesses are overwhelming healthcare systems.

Environmental stressors are intensifying. Agriculture emits over 6 billion metric tons of $CO_2$ equivalent annually and is on track to reach 9 billion by 2050. At the same time, it consumes 70 percent of the world's freshwater, while aquifers are depleting at unsustainable rates.[4] As global water demand is projected to surge by 55 percent by 2050,[5] escalating competition between food production, economic growth, and human survival is inevitable. Currently, 40 percent of the global population lives in areas experiencing high water stress (where demand exceeds supply and poor quality restricts usage).[6] Meanwhile, the land base required to support a growing population-expected to reach 10 billion by 2050[7] is shrinking. Over the past 60 years, arable land has declined by nearly 30 percent,[8] driven by urban expansion, soil degradation, and the conversion of farmland to bioenergy production facilities. Marine resources are equally strained: more than a third of the world's fisheries are exploited beyond their biological limits.

2 Global Nutrition Report reveals malnutrition is unacceptably high, UNICEF, 2018
3 Child Health, African Region, WHO, 2025
4 OECD. OECD Environmental Outlook to 2050, 2012
5 OECD. OECD Environmental Outlook to 2050, 2012
6 Water crises threaten world peace, UNESCO, 2024
7 The State of Food Security and Nutrition in the World 2021, Food and Agriculture Organization of the United Nations, 2021
8 More food, but less land and water for nature: Why agricultural productivity gains did not materialize, Agriculture Water Management, 2025

### Figure 2: Food production versus net food deficit




Source: KPMG analysis

**Environmental stressors are intensifying. Agriculture emits over 6 billion metric tons of $CO_2$ equivalent annually and is on track to reach 9 billion by 2050. At the same time, it consumes 70 percent of the world's freshwater, while aquifers are depleting at unsustainable rates.[4]**

The fragility of this system was starkly exposed during the COVID-19 pandemic. Lockdowns, labor shortages, and disrupted logistics pushed 118 million more people into undernourishment[9] in 2020 alone — the first global increase in hunger in a decade. Seasonal agricultural workers, unable to follow traditional migration patterns, further intensified production challenges and food insecurity. More recently, the war in Ukraine, climate-driven disasters, and the rise of protectionist trade policies have compounded volatility. A system once reliant on global interdependence is fragmenting, as countries prioritize domestic resilience, restrict exports, and destabilize international supply chains.

The implications of this surge in undernourishment extend far beyond immediate food insecurity. A report by the Education Policy Institute, funded by the KPMG Foundation, found food poverty is particularly damaging in the early years. For children, hunger impairs memory, attention, and problem-solving skills, directly affecting their ability to learn and succeed in school. It contributes to behavioral issues, absenteeism, and lower academic performance — all of which reduce long-term educational attainment.[10] In turn, this limits social mobility and entrenches cycles of poverty. The economic consequences are profound: poor childhood nutrition is linked to reduced workforce productivity, increased healthcare costs, and lower national GDP.

These cascading pressures reveal a deeper truth: the future of food is inseparable from the future of nature. Agriculture is responsible for 80 percent of global deforestation, 70 percent of freshwater withdrawals, and nearly one-third of all greenhouse gas emissions.[11] But the impact is reciprocal. As ecosystems collapse, the food system becomes more vulnerable — to declining soil fertility, disrupted rainfall, pollinator loss, and increased pathogen spillover. Biodiversity is not a peripheral issue — it is the essential infrastructure on which food production depends.

**The future of food is inseparable from the future of nature. Agriculture is responsible for**

**80%** of global deforestation, **70%** of freshwater withdrawals, and nearly **1/3** of all greenhouse gas emissions.[11]

The IPBES Nexus Assessment (2023) underscores this interdependence, showing how biodiversity, food, water, and health are tightly interwoven. Interventions in one domain invariably affect the others. For example, intensifying food production without accounting for water constraints, or scaling renewables without considering land-use trade-offs, risks worsening systemic outcomes. In contrast, coordinated and integrated action can deliver synergistic gains. The report identifies 70 "win-win" or "no regret" interventions that advance food security, climate mitigation, water resilience, and health simultaneously demonstrating the viability of nature-positive approaches.[12]

The economic stakes are clear. According to the World Economic Forum, more than US$44 trillion in global GDP is moderately or highly dependent on nature.[13] As ecosystems degrade, supply chains face growing risks — greater price volatility, declining productivity, and tighter access to capital. Investors and consumers are responding. Seventy four percent of global consumers say they are willing to pay more for sustainably produced goods[14] while regulators are tightening rules on ESG disclosure, deforestation-linked trade, and land-use compliance.

Nature-based solutions, particularly regenerative agriculture, are beginning to shift the model. By restoring soil health, increasing on-farm biodiversity, and sequestering carbon, these practices generate measurable environmental, financial, and operational benefits. Early adopters are embedding regenerative sourcing models, investing in biodiversity credits, and partnering with Indigenous land stewards and NGOs to enhance ecosystem outcomes across their value chains. Yet most companies still treat nature as an externality — unpriced, unmanaged, and excluded from strategic planning. With the value these natural assets provide rapidly degrading, this approach is no longer viable.

The leading edge of corporate response is repositioning nature as a core stakeholder — integrated into governance, strategy, and performance metrics. Companies are beginning to track biodiversity alongside financial KPIs, develop nature-positive financial instruments, and align with cross-sector coalitions using the IPBES Nexus framework to guide risk assessment, policy engagement, and innovation. Those that embrace nature as a source of resilience and value creation — not as a cost — will be best equipped to lead in a future where ecological integrity is essential for long-term growth.

9 FAO, IFAD, UNICEF, WFP and WHO. The State of Food Security and Nutrition in the World 2022. Repurposing food and agricultural policies to make healthy diets more affordable. 2022

10 Education Policy Institute, How can we reduce food poverty for under-fives? (2024)

11 Food and Agriculture Organization of the United Nations. State of the World's Forests 2016: Forests and agriculture: land-use challenges and opportunities, 2016; UNESCO. The United Nations World Water Development Report 2021: Valuing Water, 2021; Intergovernmental Panel on Climate Change. Climate Change and Land: An IPCC Special Report on climate change, desertification, land degradation, sustainable land management, food security, and greenhouse gas fluxes in terrestrial ecosystems, 2019

12 IPBES Nexus Assessment (2023)

13 World Economic Forum (2022)

14 KPMG. Me, my life, my wallet, 2022

# A new geopolitical reality

The world has enjoyed an unprecedented 'holiday from history', a 75-year period following World War Two marked by international collaborative action in response to challenges, conflicts and disputes that has seen governments working together (and through organizations like the UN) to find multilateral solutions, creating a platform that has supported increased globalization.

However, the dramatic disruption of the COVID-19 pandemic, supply-chain shocks, trade protectionism and conflicts forced countries to place greater focus on their domestic interests and has seen instability increase and countries pull back from global co-operation. An unstable geopolitical environment, with reduced leadership and trust, undermines the assumptions that have enabled the global food system to deliver an unprecedented growth in food. Several themes evolve from this new landscape.

## Intensifying multipolar rivalry and regional fragmentation

Geopolitical power continues to decentralize, with heightened US-China competition and regional powers asserting influence. This trend is driving the rise of "geoeconomic blocs" that limit cross-border collaboration and restrict the movement of agricultural inputs, technologies, and capital. For food systems, this means greater volatility in input availability (e.g., fertilizers, agri-tech) and more fragmented trade pathways, increasing costs and reducing predictability for both producers and consumers.

## Conflicts and disruptions in key production zones and trade routes

Ongoing conflicts, regional instability (e.g. Horn of Africa, Sahel, the Red Sea), and rising tensions in the Indo-Pacific region threaten agricultural productivity and logistics. These areas represent major production or transit zones for grains, fertilizers, and other food exports. Conflict-induced disruptions undermine crop yields, damage critical infrastructure, and choke off supply chains — leading to ripple effects on global food prices and food aid distribution.

## Climate policy misalignment and energy-food trade-offs

The global transition to net zero is progressing unevenly,[15] with diverging regulatory regimes and subsidies. Misalignment between climate ambitions and energy realities is leading to underinvestment in critical logistics and food production infrastructure. Additionally, biofuel mandates and carbon pricing can reduce the availability of crops for food use, deepening tensions between energy security and food security.

## Weaponization of trade and economic nationalism

Governments are increasingly using trade, investment, and technology restrictions to achieve strategic goals. Key food-producing and exporting nations are implementing export bans and subsidies in response to domestic food inflation and political pressure. This is resulting in food nationalism that restricts global food flows, exacerbates global food insecurity — particularly in import-dependent countries — and contributes to price spikes in critical commodities.

## Rise of country-first policies and anti-globalization movements

As competition between countries grow, more focus is spent on national interest and security and less on international cooperation, driving a lack of global leadership and reduced effectiveness of multilateral organizations. Inward-looking or populist governments are more likely to adopt protectionist food policies, withdraw from multilateral institutions, and disrupt coordinated responses to food crises. This erosion of global collaboration impairs the ability to manage food supply shocks and support vulnerable populations through organizations like the World Food Programme.

### Access greater detail on this topic in the KPMG Top geopolitical risks 2025

The convergence of geopolitical risks is fragmenting the global food system. Preparation for a prolonged period of food supply uncertainty, inflationary pressure, and heightened operational and reputational risk is necessary. Organizations need to recognize that deals that have been robust being undermined by external governmental actions is now a reality.

[15] KPMG Net Zero Readiness report, 2023

# A food system in transition

If the food system's recent past continues to shape its future, there is increasing certainty that this will have severe consequences on the health of society and the planet. Alternative futures for how nutrition is provided to society may need to be envisaged and delivered not only by farmers and food companies, but all organizations that depend on a resilient food system to secure their future.

To redirect the food system towards a more sustainable, resilient future, alignment of ambition is crucial. To this end, we sought the perspectives from 200 leaders of organizations across the world (both within and outside the traditional boundaries of the food system).

We surveyed representatives from farmers and food business leaders, to executives across energy, healthcare, finance and infrastructure. Pulling their insights together, their collective ambition can be aspirational and empowering.

Despite the diversity of food system actors, there was undeniable alignment of ambition for what the food system could, and should achieve. In addition to ambitions, the survey covered a series of actions, outcomes and priorities from the respondents through qualitative and quantitative research which is shared throughout this report.

**"At the heart of a resilient global food system lies the social fabric that binds communities together. From farm to fork, food systems are more than supply chains — they are lifelines of nourishment, providers of employment, equity, and opportunity. Investing in their strength means investing in people. Resilient communities are the cornerstone of a stable society and a more sustainable, hopeful future for our planet."**

**John McCalla-Leacy**
Global Head of ESG
KPMG International

**The future of the food system is a global, interconnected ecosystem where innovation, sustainability, and equity drive production. Food producers are empowered, accessible nutrition is guaranteed for all, natural resources are restored, achieved through the adoption of circular business models. Through leveraging collaboration, technology, and guardianship, we create resilient, nutritious, and inclusive food systems for this and future generations.**

- Synthesized survey respondents vision for the global food system

# Global food system — business leader survey results

## Top three enablers of business and food system transformation

| | |
|---|---|
| Increased open market access and free trade to enable efficiency improvement and optimization of supply chains | 90% |
| Improved access to and implementation of existing science, research and technologies | 90% |
| Education and upskilling of existing labor force | 90% |

**86%** of all respondents identified building new collaborative relationships with other sectors outside of agri-food as being high importance

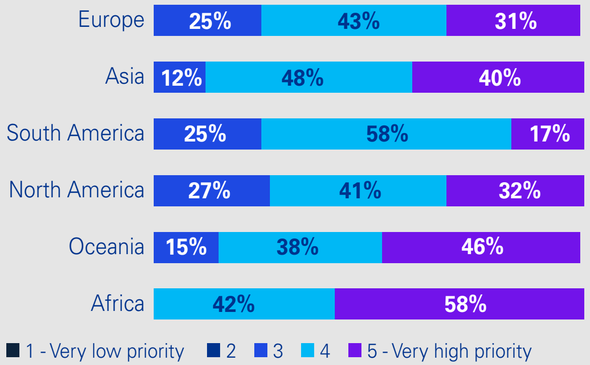
**92%** of 'President's and Partners' reinforced the importance of talent development, rating

- Education and upskilling of existing labor force
- Investment in education of young people

## Key enablers for achieving the global food system's shared vision

| | |
|---|---|
| Build new water purification, storage and irrigation infrastructure to optimize use of available freshwater | 92% |
| Raise standards on food processing, packaging and marketing to reduce the obesity epidemic facing children and adults across many parts of the world | 88% |
| Advance the integration of Generative Artificial Intelligence tools to optimize production systems and supply chains for improved efficiency and balanced outcomes | 88% |
| Commit to increased collaborative action in eliminating hunger and malnutrition through improved access to affordable and nutritious food | 87% |
| Seek to build new collaborative relationships with other sectors outside of agri-food to identify new opportunities | 86% |
| Utilize collaborative relationships within the agri-food sector to co-develop pre-competitive solutions | 85% |
| Reinforce and consolidate developments in alternative proteins to understand how consumer behavior is evolving and refine product | 85% |
| Fast-track developments in robotics and automation to reduce manual labor requirements, safety-risk, and costs, while upskilling employment demands | 84% |
| Accelerate the transition to controlled and resilient indoor farming systems particularly in areas susceptible to extreme weather volatility | 84% |
| Maximize the environmental and economic value that can be gained from the sustainable use of the world's ocean ecosystems | 84% |

## Regional perspectives on the importance of international collaboration through shared goals and co-investment in solution development




**54%** of all respondents rated **"Commit to increased collaborative action in eliminating hunger and malnutrition"** as a **very high priority**, a further **33%** as 'high priority' and **90%** of all respondents rated **"Increased open market access and free trade to enable efficiency improvement and optimization of supply chains"** as a high or very high priority.

# Part two: Ten key levers for a resilient future

# Part two: Ten key levers for a resilient future

**There are multiple competing uses for agricultural land**

**Facing into the reality of climate change and biodiversity loss**

**Water stress and shortages are the norm for more than half the global population**

**Lifespan has increased while health span decreases**

**Consumers with choice have very different expectations on food producers**

**When it comes to food 'the have nots' are too often out of sight**

**Subsidizing farmers supports production and price distortion**

**Microorganisms are causing major disruption, with growing risk**

**Capital flows drive what grows**

**Technological advances accelerate everything**

01

# There are multiple competing uses for agricultural land

The world is entering an era where land, arguably humanity's most foundational and constrained resource, is nearing its functional limits. As food demand rises, renewable energy requirements grow, urban populations and the cities that house them swell, and climate volatility intensifies, competition for prime agricultural land escalates. Economically food production is rarely the highest and best use for a packet of land, increasing the rate of land use change and threatening the resilience of food systems.

Since 1985, the world has lost nearly 180 million hectares of arable land, shrinking from 1.4 billion hectares to 1.22 billion hectares by 2020.[16] This downward trajectory is expected to continue as economics, degradation, salinization, and erosion steadily reduce the productive land base. By 2050, the world needs to plan to feed nearly 10 billion people, accommodate over 2.5 billion new urban residents and meet net-zero energy ambitions from a shrinking land envelope.

Urbanization is a highly compelling alternative land use providing landowners and developers significant financial returns around the world. Between 2000 and 2030, urban land use is projected to triple, resulting in more than 1.2 million km², much of it formerly agricultural land being developed.[17] Our survey found, 74 percent of agriculture and retail sector respondents identified sustainable land use as a critical priority, recognizing the foundational role that land has in achieving food system transformation.

Asia Pacific, home to the fastest-growing cities, will add over 1.1 billion urban residents by 2028.[18] In Africa, urban land development is expected to outpace all other regions, with over 300,000 km² projected to be converted by 2050.[19]

Since 1985, the world has lost nearly **180M** hectares of arable land, shrinking from **1.4B** hectares to **1.22B** hectares by 2020.[16]

[16] UNCCD. At least 100 million hectares of healthy land now lost each year, 2023
[17] Global Forecasts of Urban Expansion to 2030 and Direct Impacts on Biodiversity and Carbon Pools, National Academy of Sciences, 2012
[18] UNESCAP, 2023
[19] UN-Habitat, 2022

Fueling the renewable energy transition adds another layer of demand for land. Many alternative generation options are land-intensive: solar energy requires up to 40 hectares of land to generate a megawatt, while wind farms require extensive buffer zones. By 2040, wind and solar installations could occupy over 8.4 million km² globally.[20] In Europe alone, energy infrastructure will require more than 214,000 km² by 2040.[21] Plant and organic matter based bioenergy, proposed as a substitute for fossil fuels, could consume between 5 and 20 million km² of land by 2050,[22] much of which will displace food production and ecosystems unless farming systems are able to be transformed.

Historic production systems are also impacting the availability of agricultural land. It is estimated that up to 40 percent of the planet's land now has degraded soils.[23] In Oceania, Africa, and Latin America, drought, deforestation, and salinity are steadily undermining the productive capacity of land. Sea-level rise threatens up to 3 million km² of coastal land,[24] including major food-producing areas.

If current trends persist, global demand for food could exceed planetary land availability by 50 percent by 2050.[25] Rethinking how land is allocated, managed, and valued is urgent, as is the need to reimagine food production systems to reduce the demands they have for land.

## The emerging response

Evolving land management models from passive land use to proactive models to optimize use of a finite global resource. Agrifood companies are investing in regenerative practices and yield-enhancing technologies. Energy firms are co-locating infrastructure through agrivoltaics and offshore installations. Food and energy companies are collaborating on crop rotation models that deliver both food and fuel. Consumer goods brands are reconfiguring sourcing to reduce land intensity through exploring biomaterial and circular economy solutions.

**Transformation backed by strategic intent: 79 percent of respondents cited land optimization as essential to delivering future food system outcomes (KPMG Global food resilience survey, 2024).**

Technology is accelerating this shift. AI-powered optimization, digital traceability, and satellite monitoring are enabling faster, smarter land-use decisions. Cross-sector alliances-between agriculture, energy, and urban developers- are piloting integrated models that reduce conflict and unlock shared value. Integrating controlled environment agriculture, aquaculture, community gardens into smart urban design can give urban communities a role in feeding themselves.

**"The line between food and energy systems is blurring fast. As countries try to decarbonize and secure energy supply, it's clear these decisions directly affect food availability, affordability, and sustainability. We need joint planning, not isolated strategies."**

**Anish De**
Global Head of Energy, Natural Resources and Chemical
KPMG International

20 IRENA, 2023
21 Briefing on spatial requirements for a sustainable energy transition in Europe, European Environmental Bureau, 2024; KPMG Analysis
22 What does net-zero emissions by 2050 mean for bioenergy and land use? IEA, 2021
23 UNCCD. Global Land Outlook 2: Land Restoration for Recovery and Resilience. United Nations Convention to Combat Desertification, 2022
24 Intergovernmental Panel on Climate Change. Climate Change and Land: An IPCC Special Report on climate change, desertification, land degradation, sustainable land management, food security, and greenhouse gas fluxes in terrestrial ecosystems, 2019
25 Creating a Sustainable Food Future: A Menu of Solutions to Feed Nearly 10 Billion People by 2050 WRI, 2019

Farming as a production operation is perhaps the world's most diverse economic sector, with significant differences between products, environments, and countries.

## North America

In North America, urban land demand is set to rise sharply, with the United States alone projected to increase its urban footprint from 273,226 square kilometers in 2020 to 392,400 square kilometers by 2060.[26, 27] Simultaneously, renewable energy expansion will require over 51,023 square kilometers of land by 2035.[28] Agriculture, which currently spans 4.06 million square kilometers,[29] will face pressure as bioenergy crops consume an increasing share of arable land, growing from 242,812 square kilometers in 2023 to 263,046 square kilometers by 2050.[30] While North America benefits from substantial land resources, urban sprawl and energy projects threaten long-term agricultural capacity.

## Latin America

Latin America's abundant arable land positions it as a critical player in global food and energy production. By 2030, the region's harvested land is expected to grow to 1.6 million square kilometers,[31] driven by demand for oilseeds, sugar crops, and cereals. However, urban expansion, which will require over 307,000 square kilometers by 2050,[32] and renewable energy projects will compete with agricultural uses. Solar energy capacity alone will require an estimated 2,330 square kilometers by 2030. While the region holds untapped potential for agricultural and bioenergy growth, balancing these demands without degrading natural ecosystems will be a key challenge.

## Europe

Europe faces a unique mix of land demand pressures, including the expansion of renewable energy and urban areas alongside reductions in agricultural land. By 2040, renewable energy projects will require approximately 214,000 square kilometers,[33] with wind and solar accounting for the majority. Simultaneously, cropland in Europe could shrink by up to 284,000 square kilometers by 2050,[34] depending on reductions in food waste and animal product consumption. Urban areas are expected to expand by 5,000 square kilometers by 2030,[35] further stressing land resources. Europe's commitment to carbon neutrality and sustainable food systems will necessitate balancing these demands through innovative policies and land-use efficiencies.

## Africa

Africa's urban population is expected to grow at the fastest rate globally, driving urban land demand to unprecedented levels. Africa's vast arable land offers potential for agricultural expansion, but challenges such as poor infrastructure, lack of water, and climate-induced land degradation limit its ability to realize this potential. Furthermore, renewable energy expansion, particularly solar and wind, will require significant land allocations to meet growing energy demands. Without substantial investments in land restoration and sustainable farming practices, Africa risks overburdening its land resources as competing demands converge.

## Asia Pacific

The Asia Pacific region is projected to see unparalleled land demand due to rapid urbanization and population growth, with over 1.1 billion people expected to have migrated to cities between 2008 and 2028.[36] Urban areas, which already span 32,000 square kilometers, will expand significantly, increasing demand for infrastructure and displacing agricultural land.[37] This pressure comes as the region grapples with the smallest per capita cropland availability globally, at just 0.22 hectares per person. Renewable energy investments are projected to reach US$1.3 trillion by 2030 (double that of the previous decade), with the land requirement for renewable energy increasing from 19,143 square kilometers in 2023 to 102,592 square kilometers by 2050.[38] Compounded by climate change and land degradation, Asia Pacific faces a critical challenge in balancing competing land uses without breaching sustainable thresholds.

## Oceania

Oceania, led by Australia and New Zealand, will experience both moderate urban growth and significant land pressures from renewable energy and agriculture. Urban areas in the region are expanding, but land degradation from climate change threatens agricultural output. Renewable energy projects, including solar and wind, are expected to consume significant land, though precise figures depend on technological advancements. With limited fertile land and fragile ecosystems, Oceania's ability to meet increasing food and energy demands will depend on innovative solutions like precision agriculture and sustainable land management.

26 Center for Sustainable Systems, University of Michigan. 2024. "US Cities Factsheet."
27 US Urban Forest Statistics, Values, and Projections, Society of American Foresters, 2018
28 How Much Land Would it Require to Get Most of Our Electricity from Wind and Solar? The Equation, 2023
29 United States Agricultural Land, Trading Economics, 2025
30 KPMG analysis, 2025
31 Regional brief: Latin America and the Caribbean, OECD-FAO Agricultural Outlook 2021–2030, 2021
32 How will the cities of Latin America and the Caribbean grow? Sustainable cities, 2024
33 Briefing on spatial requirements for a sustainable energy transition in Europe, European Environmental Bureau, 2024
34 Main land use patterns in the EU within 2015–2030, European Commission, 2019
35 Ibid.
36 The Urban Century; Cities and Urbanization in Asia, National Institute of Urban Affairs, 2023
37 A global dataset of annual urban extents, Earth System Science Data (ESSD), 2022
38 KPMG analysis, 2025

02

# Facing into the reality of climate change and biodiversity loss

Climate change is no longer a distant threat to global agriculture — it is an immediate, compounding force reshaping the productivity, stability, and viability of food systems.

With extreme weather events now causing an estimated US$700 billion in annual damages,[39] climate volatility is undermining the core assumptions of traditional farming systems, exposing vulnerabilities in both high — and low — income regions.

Shifting rainfall patterns, prolonged droughts, record heatwaves, and intensified storm cycles are already constraining yields and degrading the natural environment on which agriculture depends. Scientific projections suggest that by 2050, global yields for wheat, maize, and rice could fall by up to 30 percent in key growing regions.[40] In South Asia and Sub-Saharan Africa, crop stress is expected to be particularly acute — placing food security, farmer livelihoods, and regional political stability at risk.

Crucially, these disruptions are not linear. The frequency and severity of extreme weather events is accelerating, destabilizing supply chains, elevating insurance costs, and increasing food price volatility. For example, simultaneous droughts and heatwaves across multiple breadbasket regions are now statistically more likely, threatening systemic failures that rip through global markets slashing supplies, increasing prices and undermining food security.

Historically, nature has been treated as an externality to the food system. Biodiversity, the planet's biological life system, is in steep decline. Ecosystems that help regulate climate, pollinate crops, and replenish soils are beginning to collapse. With over 1 million species at risk of extinction,[41] biodiversity's buffering capacity is weakening, which is being exacerbated by climate change. The economic costs of exploiting nature have to date not been properly recognized, resulting in it being discounted in economic decision-making. This is no longer tenable.

Our survey reinforces this urgency: **76%** of European respondents and **69%** of African leaders ranked climate resilience and adaptation as critical to the future of the food system.

[39] WMO. State of the Global Climate, 2022
[40] Intergovernmental Panel on Climate Change. Climate Change and Land: An IPCC Special Report on climate change, desertification, land degradation, sustainable land management, food security, and greenhouse gas fluxes in terrestrial ecosystems, 2019
[41] IPBES. Summary for policymakers of the global assessment report on biodiversity and ecosystem services of the Intergovernmental Science-Policy Platform on Biodiversity and Ecosystem Services, 2019

However, the window for adaptation is narrowing. The Paris Accord targets are being missed, commitments are being abandoned or diluted, and emissions continue to rise. Under these conditions, entire agricultural sectors, particularly those in flood-prone, drought-sensitive, or monoculture-dependent regions, face the prospect of becoming uninsurable. This could catalyze a credit contraction across food-producing regions, triggering financial instability that sees farmers leaving the industry, compounding food instability.

Nature-based solutions, as a way of working with nature, provide a pathway forward. Recognizing the dependency on the environment and appropriately reflecting the value nature delivers through these nature-based solutions can enable organizations to generate economic returns. This includes leveraging tools such as the KPMG WBCSD Nature-based solutions map, and could include restoring degraded landscapes, rebuilding soil carbon, and increasing agroecological complexity to enhance resilience while contributing to global biodiversity and decarbonization goals.

Regenerative farming practices — such as no-till cultivation, cover cropping, and integrated crop-livestock systems — build resilience from the ground up and when practiced over years can deliver compounding benefits to the environment and the farmer. Complement these practical farming practices with AI-powered climate modelling, smart irrigation, and bioengineered seed varieties, there is the ability to provide new layers of adaptive capability, especially in regions vulnerable to shifting growing seasons and water scarcity. Part of the solution must also be financial products that recognize and reward the actions being taken on farm, through climate or biodiversity credit mechanisms, and new finance and insurance products.

As outdoor farming becomes less predictable, controlled-environment agriculture (CEA) is emerging as a critical buffer. Vertical farms, hydroponics, and greenhouse systems offer climate-proofed food production using up to 95 percent less water and significantly less land, though in many cases must refine their business models and overcome the obstacle of high energy use. The CEA sector is growing at an annual rate of almost 20 percent,[42] with major investments concentrated in urban centers where supply chain resilience and proximity to consumers are prized.

[42] MarketsandMarkets, Controlled Environment Agriculture Market by Growing Method, Crop Type, Facility Type, Component, and Region — Global Forecast to 2027, 2022

## The emerging response

Businesses are increasingly recognizing that preparing for climate volatility is not a compliance issue, it is a competitive imperative. Leading agrifood players are investing in adaptive technologies, diversifying sourcing geographies, and embedding carbon sequestration and nature restoration into their value chains.

Agri-insurers are piloting parametric, climate-indexed coverage, while supply chain actors are deploying AI to forecast disruptions and model climate risk in procurement. Banks are working with their customers to deliver sustainable finance solutions to fund investment their customers are making in mitigating their businesses impact on climate and the environment.

Our survey found, 64 percent of respondents under age 35 prioritized regenerative practices and climate resilience, signaling the next generation's demand for transformation. These leaders understand that resilience is not only about mitigating losses — it is about unlocking opportunity in the transformation of global agriculture.

**"There's still a tendency in boardrooms to treat biodiversity loss as an abstract or future risk, or to not even think about it at all. But degraded soils, declining pollinators, and collapsing ecosystems are already disrupting food production and connected value chains and this is being, and will increasingly be, further exacerbated by the impacts of climate change. Nature & Biodiversity must be seen as a core operating asset for all businesses connected into the food system"**

**Mike Hayes**
Climate Change and Decarbonization Leader
Global Head of Renewable Energy
KPMG in Ireland

03

# Water stress and shortages are the norm for more than half the global population

While there are some plants and animals that can thrive with scant water resources, for the majority of the species that have historically formed the basis of our diet, adequate water is crucial to deliver the yields necessary to feed the global population.

Over 50 percent of the world's population faces seasonal or chronic water shortages (World Bank, 2023),[43] forcing authorities to implement allocation, rationing, and charging mechanisms to stretch the resource that is available. If current consumption patterns persist, global water demand is projected to exceed sustainable supply by 40 percent by 2030,[44] exacerbating food security challenges, compounding health challenges, placing pressure on ecosystems and damaging economies.

As water resources dry out, attention is falling on how water is utilized. Farmers draw more water globally than any other activity (using around 70 percent of available freshwater). Questions are often raised about how effectively this water is being utilized. The FAO reports inefficient irrigation practices contribute to more than 60 percent of applied water being used unproductively.[45]

This concern was echoed by the survey respondents, where 79 percent of participants in the agricultural sector ranked irrigation efficiency and water purification as top strategic priorities — especially among older leaders with firsthand experience managing physical resource constraints.

Agriculture contributes to the drain on aquifers, with major natural reservoirs supplying key agricultural regions — such as the North China Plain and the Ogallala in North America — depleting as withdrawals exceed replenishments.

Climate volatility increases the likelihood of extreme drought and flood events, also intensifying the water challenges the food system faces. Rising global temperatures increase evapotranspiration, reducing water availability, downgrading soil quality, and increasing the risk that productive land is lost. At the same time, saline intrusion into aquifers threatens 17 percent of global croplands, particularly in low-lying coastal regions.[46]

Over **50%** of the world's population faces seasonal or chronic water shortages (World Bank, 2023)[43]

[43] World Bank. High and Dry: Climate Change, Water, and the Economy, 2016
[44] Water crises threaten world peace, UNESCO, 2024
[45] Food and Agriculture Organization of the United Nations. The State of the World's Land and Water Resources for Food and Agriculture — Systems at Breaking Point, 2021
[46] Intergovernmental Panel on Climate Change. Climate Change 2022: Impacts, Adaptation and Vulnerability. Contribution of Working Group II to the Sixth Assessment Report of the IPCC, 2022

Irresponsible water use places pressure on the food system's license to operate and can leave farmers without the priority access to water they have historically enjoyed. Water-intensive sectors, including protein production (like dairy and meat) and beverage manufacturing, face increasing scrutiny from regulators, investors, and consumers as water stewardship becomes a key risk facing their organizations.

However, it is not just the food system that will be under the microscope in respect of intensive water usage. Emerging water-intensive infrastructure (such as data centers being built to unlock the potential of new AI technologies) and water-intensive manufacturing (such as textiles) will also be in the spotlight. This could suggest new opportunities for alliances where water could be repurposed from data centers for use in food production or new crop cultivars evolved that are able to be processed using less water.

## The emerging response

As water scarcity intensifies, organizations are embedding water risk assessments into core strategies to ensure continuity and resilience. They are then exploring how they can utilize emerging solutions including precision irrigation, AI-driven water management, and housed or covered farming systems that drastically reduce water use.

Cross-sector collaboration — such as repurposing greywater from data centers for agriculture — can unlock shared infrastructure benefits. 92 percent of all respondents reported water stewardship as a top concern for long term resilience.

Water credit markets are incentivizing farmers to improve water use and quality, while companies are investing in watershed restoration and closed-loop recycling systems.

New water labelling standards can boost transparency and brand trust, especially in water-intensive sectors like protein, dairy, and beverages. Looking ahead, regions with abundant, well-managed water may gain competitive advantage through water exports — either directly or via high-value, water-embedded goods — positioning water not just as a risk but as a strategic asset.

**"We can't talk seriously about food system resilience without addressing infrastructure. Logistics, water systems, and urban planning all shape how food is grown and transported, and the equity of distribution. Food can be as much an infrastructure policy and investment issue as it is an agricultural one."**

**Richard Threlfall**
Global Head of Infrastructure, Government and Healthcare
KPMG International

04

# Lifespan has increased while health span decreases

Global life expectancy has never been higher. Yet for billions of people, the additional years gained are not lived in good health. Non-communicable diseases (NCDs), such as obesity, cardiovascular disease, diabetes, and certain cancers, are now the leading cause of death globally, responsible for over 70 percent of annual mortality (WHO, 2023).[47] At the same time, undernutrition and micronutrient deficiencies continue to afflict millions. In 2022, more than 45 million children under five were suffering from severe acute malnutrition, and nearly 150 million were stunted.[48] The global food system is struggling to meet the most basic metric of its success: nourishing people.

In high-income and urban regions, diets are dominated by ultra-processed, energy-dense, nutrient-poor products, cheap, accessible, and aggressively marketed. This has created a paradox where populations are overfed but undernourished, with metabolic disorders rising even as dietary diversity declines.

Meanwhile, in low-income and conflict-affected regions, food insecurity is deepening. Households are increasingly unable to access, let alone afford, nutritious diets, with many surviving from meal to meal on a subsistence diet. This bifurcation between overconsumption and deprivation reflects a system that has prioritized efficiency and scale over equity and nutrition.

The survey results reinforced this divergence: while leaders in high-income countries emphasized reducing obesity and ultra-processed food consumption, their peers in Africa and Asia ranked hunger and malnutrition as top priorities — underscoring the dual burden confronting global health systems.

A growing evidence base links diet to long-term wellbeing, productivity, and health system sustainability. Governments are recognizing the cost burden of poor diets, estimated as being in the trillions of dollars annually, particularly in healthcare and lost productivity[49] and are beginning to recognize the role food can play in public health strategy. Initiatives promoting food as medicine, alongside clearer labelling and fiscal incentives for healthier products, are gaining policy support as the requirement to reshape foods relationship with health becomes urgent.

In 2022, more than **45 million** children under five were suffering from severe acute malnutrition, and nearly **150 million** were stunted.[48]

[47] World Health Organization. Noncommunicable diseases: Key facts, 2021
[48] Malnutrition in children, UNICEF, 2023
[49] Global Panel on Agriculture and Food Systems for Nutrition. The Cost of Malnutrition, 2016

Concurrently, the rapid evolution of technology is enabling personalized, preventative nutrition to develop at pace. AI-driven dietary recommendations, microbiome mapping, and precision fermentation are unlocking the potential to curate diets to an individual's specific needs in the same way pharmaceuticals have been prescribed for decades. The rise of functional foods — fortified with probiotics, adaptogens, and targeted micronutrients — is symptomatic of a broader shift toward health-aligned consumption. Products supporting immunity, cognitive performance, metabolic health, and gut function are moving from niche to mainstream, driven by greater awareness and wearable health tech.

Not surprisingly access to emerging functional diets is uneven. While some consumers curate diets with biometric feedback, others lack access to clean water and sufficient calories.

These advances signal a shift towards food not only as sustenance or indulgence, but as medicine. However, the space between food and medicine is also of interest to the life sciences sector. The growing use of GLP1 drugs (weight loss pens) to manage diabetes and obesity should be recognized as the first generation of a series of drugs that influence the microbiome and impact the amount of a food that a person needs to eat. These drugs have the potential to fundamentally change how society interacts with food.

The global food system must recognize its role is not just to deliver calories, but to also provide a platform for lifelong health. In doing so, it can deliver not only improved social outcomes but also create economic and environmental benefits.

## The emerging response

Businesses are reimagining their role from food producers to health enablers. Leading companies are investing in reformulation to reduce sugar, salt, in ultra-processed foods while looking for ingredients that can boost their nutritional density.

Our survey found, 88 percent of respondents prioritized reducing obesity and improving food processing — reflecting a strong consumer — focused vision of health.

Partnerships with research institutions and healthcare providers are informing product innovation grounded in clinical outcomes. AI is being used to guide precision nutrition platforms, while digital tools support labelling transparency and traceable claims.

Insurance partnerships and policy shifts are opening new revenue pathways for foods with verified health benefits.

In a shifting landscape, companies that position nutrition at the heart of their strategy are aligning with rising consumer expectations, public health imperatives, and long-term profitability.

**AI-driven dietary recommendations, microbiome mapping, and precision fermentation are unlocking the potential to curate diets to an individual's specific needs in the same way pharmaceuticals have been prescribed for decades. The rise of functional foods — fortified with probiotics, adaptogens, and targeted micronutrients — is symptomatic of a broader shift toward health-aligned consumption — projected to grow by 40 percent by 2030.**

05

# Consumers with choice have very different expectations on food producers

Historically, the global food system has evolved to serve a single mandate: make food abundant and cheap. While this delivered a tremendous lift in food supply, it also entrenched a low cost, monocultural mindset that one-size-fits-all in terms of food. It failed to reflect the cultural diversity of global consumers and how they interact with food.

However, the world is changing, quickly. Consumers, particularly those with sufficient affluence to make choices about the food they eat, have new expectations: they are demanding transparency in sourcing, ethical production, environmental sustainability, cultural authenticity, and tailored nutritional experiences. What people eat is becoming a reflection of who they are and what they stand for.

Modern food consumers increasingly seek personalization. The convergence of genomics, wearable health tech, and AI is fueling a US$48 billion personalized nutrition market by 2028.[50] Meanwhile, the rise of plant-based, cultured, and fermented proteins is shifting the center of gravity in protein consumption. These alternatives, driven by ethics, climate concerns, and innovation, are no longer fringe — they are fast becoming mainstream.

74 percent of younger respondents (under 35) viewed alternative proteins as a high priority for system transformation, underscoring generational shifts toward ethical and sustainable food choices.

Similarly, diverse cuisines and indigenous foodways are rising in prominence as consumers pursue a "voyage of discovery" that reflects multicultural societies and global connectivity.

Technological innovation is not only unlocking new ways to engage with food but delivering entirely new categories of nutrition. Precision fermentation and cellular agriculture are being deployed to create nutrient-rich alternatives that can be customized for specific health outcomes.

Digitalization is additionally unlocking food producers, processors and distribution to serve increasingly fragmented markets. AI models, blockchain tools, and digital twins now make it possible to trace supply chains, validate ethical claims, and offer adaptive product experiences. E-commerce and direct-to-consumer models are disrupting traditional retail and enabling personalized engagement; reshaping not just what consumers eat, but how they access it.

Modern food consumers increasingly seek personalization. The convergence of genomics, wearable health tech, and AI is fueling a **US$48 billion** personalized nutrition market by 2028.[50]

[50] BCC Research. Personalized Nutrition: Global Markets, 2023

While food sovereignty and consumer choice grow in some markets, others remain trapped in cycles of scarcity and food insecurity. Protectionist trade policies, supply disruptions, unnecessary food waste, and price volatility compound the difficulty the world's most vulnerable communities face in accessing diverse, nutritious food. Amongst these consumers the joy that food can bring gives way to a more fundamental struggle: the right to food itself.

This contrast is stark but also clarifies what our food system needs to aspire to deliver. It underscores the need for a food system capable of serving both health span and access, individual expression and nutritional security.

**"We're seeing a profound shift in how consumers relate to food — especially those with the ability to make choices. It's no longer just about taste or convenience. Expectations now span ethics, transparency, sustainability, provenance, and personalization (including compatibility with the new weight-loss drugs). For food producers, this isn't a niche trend — it's a structural shift that requires relentless product innovation as much as system-wide accountability. The businesses that thrive will be the ones that treat these expectations not as marketing noise, but as core strategic design principles."**

**Isabelle Allen**
Global Head of Consumer & Retail
KPMG International

## The emerging response

Progressive businesses are navigating these dynamics by anchoring food innovation in health, identity, and equity. Leading firms are reformulating products to support wellbeing, diversifying portfolios to reflect cultural and ethical values, and deploying technology to personalize consumer engagement.

85 percent of respondents ranked cross-sector collaboration — including with healthcare and energy providers — as essential to delivering value-driven food experiences.

AI-powered nutrition, blockchain traceability, and regenerative sourcing are aligning product strategies with individual expectations. At the same time, forward-looking companies are investing in nutrient-dense, affordable products for underserved markets — recognizing that sustainable growth demands inclusive nutrition.

In a fractured food landscape, market leadership will go to those who can serve both the expressive consumer and the vulnerable household-with credibility, creativity, and conscience.

06

# When it comes to food 'the have nots' are too often out of sight

The global food system produces more than enough to nourish every person on the planet, yet the UN estimate over 820 million people experience hunger and food insecurity on a daily basis. At the same time nearly 30 percent of food produced, equivalent to 1.3 billion tons annually, is wasted.[51] This disconnect reflects deep structural inefficiencies in how food is allocated, moved, consumed, and valued across the world.

The issue is not a supply problem, it is a systemic failure of the food system to recognize that food equity is a central tenet of its license to operate.

At the heart of food equity three factors converge:

- excess consumption and waste in some regions;
- scarcity and malnutrition in others;
- and growing volatility across all. Economic disparity, weak infrastructure, market distortions, and climate-linked supply shocks have all contributed to a system where some overconsume while others face starvation.

The psychological toll of food insecurity is profound. For individuals and families facing uncertainty about their next meal, the constant stress can lead to chronic anxiety, depression, and emotional distress. Children are especially vulnerable, with hunger affecting their emotional development, concentration, and overall mental well-being. These often unseen burdens deepen the physical and economic impacts of food insecurity.

The problem is not hidden, it has been understood for decades and on occasions makes headlines (for example Band Aid in 1984 or during shelter at home restrictions for the COVID-19 pandemic), however it seems for those that have enough food, it can be argued it is an out of sight, out of mind issue.

These inequities were reflected with the executives we surveyed, where hunger and malnutrition were ranked a top priority by 82 percent of African and 76 percent of Asian respondents, contrasting with lower urgency expressed in some high-income regions — highlighting the global asymmetries in food access.

Food inflation is exacerbating these divides. In the past three years, global food prices have risen at rates exceeding general inflation, disproportionately impacting vulnerable populations. At the same time, producers have been squeezed between rising input costs and market structures that fail to reward sustainable production. This misalignment, where food becomes unaffordable for many yet unprofitable for those who grow it, threatens food resilience. Without a refreshed mindset, it risks triggering systemic breakdowns, that history suggests will lead to civil unrest, mass migration, and economic destabilization.

The global food system produces more than enough to nourish every person on the planet, yet the UN estimate over **820 million** people experience hunger and food insecurity on a daily basis. At the same time nearly 30 percent of food produced, equivalent to 1.3 billion tons annually, is wasted.[51]

[51] Food and Agriculture Organization of the United Nations (FAO). Global Food Losses and Food Waste — Extent, Causes and Prevention, 2011

Just-in-time supply chains — optimized for efficiency, not resilience — have proven brittle in the face of pandemics, conflict, and climate extremes. As trade barriers, phytosanitary barriers, protectionist policies, and logistical choke points have increasingly created circumstances that are constraining the flow of food across borders and regions.

Beyond logistics, food equity also intersects with human rights. Enforcement of ethical practices across supply chains remains patchy, with millions of agricultural workers operating under unsafe or exploitative conditions. Labor violations, gender discrimination, and land grabs remain pervasive in rural areas in parts of the world. Traceability and responsible sourcing are not just compliance issues, they need to be recognized across the food system as core to the license to operate, central to an organizations ability to build a trusted brand and secure market access.

72 percent of retail sector respondents prioritized supply chain transparency — emphasizing accountability not just for products, but for people.

Despite these challenges, the opportunity is profound. Reducing food loss by just 25 percent could feed an additional 870 million people annually (UNEP, 2023).[52] Put simply, reducing food waste by less than 25 percent feeds the world. Advances in AI-powered logistics, digitally enabled marketplaces, and decentralized food hubs are unlocking new ways to close the food gap. What's needed to feed the current global population is not more food, but smarter systems and the courage to redesign business models so that some priority is attached to access, equity, and resilience.

## The emerging response

Progressive businesses are reengineering supply chains to be equitable, efficient, and resilient. Investment is flowing into AI-optimized logistics, cold-chain expansion, and digital traceability to reduce waste and improve responsiveness.

Organizations from the food system and beyond are participating in food recovery networks to redistribute surplus and developing inclusive sourcing models that prioritize human rights and local livelihoods. Retailers and manufacturers are partnering with tech startups to pilot blockchain for ethical sourcing and build transparent farm-to-fork journeys.

At the same time, new pricing frameworks are being explored to balance consumer affordability with fair grower returns. By embedding equity, ethics, and efficiency into supply chain design, businesses are not only helping stabilize the first mile of their own supply chains, they are redefining competitiveness in a volatile world.

**"Conversations around sustainable food systems often fail to address the needs of the most vulnerable. Food equity must be at the heart of ESG strategy — integrated with emissions and efficiency. True resilience comes from systems designed to support everyone, especially those at greatest risk."**

**Apurba Mitra**
Partner — ESG and Climate Change Lead
KPMG in India

[52] United Nations Environment Programme (UNEP). Reducing Food Loss and Waste: Feeding the World, 2023

07

# Subsidizing farmers supports production and price distortion

The global food system is entangled in a complex web of subsidies and government incentives, designed with the stated aim of bolstering food security and supporting agricultural livelihoods. In practice, these incentives often distort markets, encourage inefficient production, undermine nutritional diversity, and accelerate environmental degradation. While food subsidies have helped stabilize supply in many regions, they have also contributed to unintended consequences that undermine food system resilience.

Subsidies — classified under WTO frameworks as Amber (trade-distorting), Blue (linked to production limits), and Green (non-distorting) — often fall short of delivering balanced outcomes. Loopholes, political pressures, and ambiguous classification allow governments to support entrenched, unsustainable food production practices on the platform of domestic food resilience despite these programs frequently being at odds with environmental and nutritional goals.

The *survey* revealed frustration with this dynamic, with multiple respondents describing subsidies as "misaligned with sustainability goals" and "a barrier to innovation." The result is a system that anchors production to the past, rather than unleashing innovation to meet future needs.

The environmental consequences of subsidies are particularly stark. In the European Union, CAP subsidies have contributed to nitrogen overload from fertilizer-intensive farming — releasing 10 million tons of nitrogen into waterways annually.[53] In Brazil, subsidies linked to cattle and soy have in the past accelerated deforestation, with 70 percent of cleared land converted to pasture between 2005 and 2018. In India, subsidized electricity for groundwater pumping has depleted aquifers, and supported rice and wheat production despite it being poorly suited to the regional environment.

Target 18 of the Global Biodiversity Framework seeks to reduce harmful incentives by at least US$500 billion per year by 2030, and scale up positive incentives for biodiversity. Moving forward, various countries have set ambitious goals in line with this target in their national biodiversity strategy and action plan (NBSAP).

Target 18 of the Global Biodiversity Framework seeks to reduce harmful incentives by at least **US$500** billion per year by 2030, and scale up positive incentives for biodiversity.

[53] European Environment Agency. Nutrient pollution in Europe: A summary., 2018

Nutritional outcomes are equally compromised. In the United States, subsidies for corn and soy underpin the low cost of ultra-processed food ingredients which have fueled the obesity and metabolic disease epidemics in the US and beyond. In Sub-Saharan Africa, import subsidies for wheat and rice have displaced indigenous crops like millet and sorghum, diminishing dietary diversity and weakening food sovereignty.

Subsidies can also undermine global trade fairness. The dumping of surplus subsidized production such as EU dairy products (grown not because of demand but to receive an EU subsidy) in West Africa has displaced local producers, eroding rural economies and reinforcing the dependency of communities on support from NGO's. China's vast grain reserve system, backed by US$86 billion in subsidies, has caused price distortions and significant food waste. The recent trend towards deglobalization and towards localization appears to be compounding these issues, as governments double down on incentives to lift national self-sufficiency. This has the impact of reducing cooperation just when climate change demands global solutions.

This fragility was echoed in the *KPMG survey,* particularly by finance and agrifood leaders, who ranked policy reform and cross-sector alignment as key enablers of future transformation.

The path forward lies in reshaping subsidies towards climate-resilient, nutrition-sensitive, and innovation-friendly outcomes. Redirecting incentives to support sustainable practices, improving transparency, and aligning frameworks with international environmental and development goals must become a future policy.

## The emerging response

While subsidy reform lies primarily in the hands of governments, businesses are not passive actors. Forward-looking companies are engaging with policymakers to advocate for incentives that support sustainable production and reward regenerative outcomes.

Producers are investing in digital traceability systems to track the origin and impact of subsidized inputs, enabling more transparent procurement. Agrifood innovators are piloting market models that scale biodiversity, nutrition, and efficiency — regardless of subsidy arrangements by working with supply chain partners to place value on these critical attributes inherent in the food that is produced.

Multinational firms are using their reach to support localized diversification efforts, helping restore traditional crops and reduce dependency on distorted staples. This can involve rethinking business models to deliver solutions to small holding farmers creating win/ win solutions for all.

Business leaders increasingly recognize that misaligned subsidies pose long-term strategic risks — fueling volatility, undermining sustainability targets, and eroding consumer trust.

**"The role of public subsidies both for the food system, but also for sustainable well-being and economic resilience was born in a radically different environment and needs a thorough rethink. Right now, the mechanics of too many direct or indirect subsidies result in supporting quantity and being focused on short term economic growth over long term sustainable economic resilience. Redirecting that support to seek to balance domestic food security, whilst also safeguarding our farming communities as well as nature and biodiversity has the potential to shift the entire system whilst failing to do so will lead to potentially devastating economic and ecosystem collapse."**

**Sarah Nelson**
Global Lead Director — Nature and Biodiversity
KPMG International

08

# Microorganisms are causing major disruption, with growing risk

The COVID-19 pandemic offered a stark reminder of how a microscopic organism can undermine global systems; disrupting supply chains, collapsing consumer confidence, and destabilizing economies. The next contagion event the world must deal with may be quite different to the COVID pandemic. The food system faces a constellation of microbial risks-from antimicrobial resistance (AMR) and foodborne pathogens to highly contagious animal diseases-that threaten health, trade, and food security in equal measure.

The World Health Organization warns that by 2050, AMR could cause 10 million deaths annually, overtaking cancer as the leading cause of mortality.[54] This silent pandemic is fueled in part by overuse of antibiotics in food production, particularly animal agriculture, where sub-therapeutic dosing remains prevalent in many regions. As resistance spreads, both human medicine and livestock systems face rising costs, declining efficacy, and heightened vulnerability to infectious disease.

Simultaneously, foodborne pathogens continue to exact a staggering toll. Each year, unsafe food causes illness in an estimated 600 million people-nearly 1 in 10 of the global population-and accounts for 420,000 deaths.[55] Beyond the health impacts, these outbreaks cost the global economy billions in lost productivity, hospitalization, product recalls, and food waste. As food systems have globalized, so too do the risks that contagions move across continents at pace.

The resurgence of virulent diseases such as African Swine Fever and avian influenza continues to disrupt protein markets. In China, African Swine Fever wiped out over 40 percent of the national pig herd between 2018 and 2020,[56] creating price spikes and food security concerns. More recently, avian influenza outbreaks in Europe, North America, and Latin America have forced the culling of tens of millions of birds, tightening poultry and egg supply chains, reducing availability and increasing prices.

Climate change and biodiversity loss are shifting ecological boundaries, and, as consequence, the geographic range of vectors, pathogens, and zoonotic spillover events. The fragmentation of natural ecosystems is increasing the frequency of animal-human-environment interfaces — creating fertile ground for future contagion to cross between species.

The World Health Organization warns that by 2050, Anti Microbial Resistance could cause **10 million** deaths annually, overtaking cancer as the leading cause of mortality.[54]

[54] Nutrition and Food Safety WHO, 2015
[55] Ibid.
[56] USDA, Ecnomic Research Service, How China's African Swine Fever Outbreaks Affected Global Pork Markets, 2023

Investment in surveillance, early detection, and integrated biosecurity protocols need to be well funded and operating globally to enable effective management of microbial risk. Advances in microbial genomics, real-time biosensors, and predictive analytics also offer promising tools. Meanwhile, innovations in synthetic biology and precision fermentation are enabling food production pathways that reduce reliance on antibiotics and animal inputs altogether.

Given the food system is a global system built on biological foundations, resilience will hinge on the ability to detect, prevent, and respond to microbial threats before they escalate into systemic shocks. In a volatile microbial landscape, those investing in prevention, not just recovery, are defining the new benchmark for resilience.

**"We're seeing more people get sick from food — not just from poor hygiene, but from deeper issues like antibiotic resistance and weak monitoring systems. In many countries, food safety, nutrition, and healthcare aren't connected the way they need to be. If we want to protect health, especially in vulnerable communities, we have to treat food safety as part of the health system, not something separate."**

**Dr. Edward Fitzgerald**
Global co-Lead, Health equity and access in developing markets
KPMG International

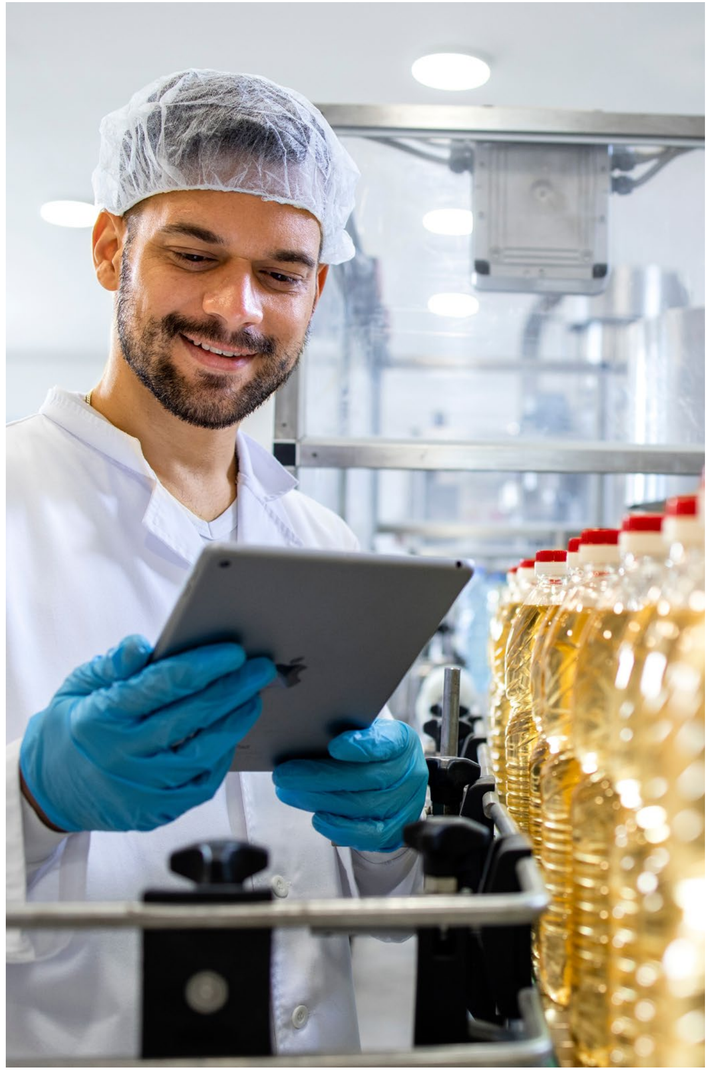
## The emerging response

Forward-thinking businesses are elevating biosecurity to a core strategic priority. Agrifood companies are investing in real-time pathogen detection, improving hygiene protocols across production systems, and deploying traceability platforms that enable rapid response to contamination events.

Some are moving upstream — reformulating products in their supply chains around low-risk ingredients or protein alternatives that reduce exposure to animal-borne disease.

Collaboration with global health agencies, veterinary authorities, and biotechnology partners is becoming standard practice in high-integrity brands.

Meanwhile, insurance, export access, and consumer trust are increasingly tied to traceable food safety performance.



09

# Capital flows drive what grows

The reality is that capital fundamentally shapes what gets produced, how systems evolve, and who benefits. In the food system, capital allocation influences everything from the crops grown to the pace of innovation and the resilience of supply chains. Yet historically, food systems have struggled to attract diversified, large-scale capital investment. Long payback periods, climate-linked volatility, and perceived lack of scalability have limited the sector's appeal to mainstream investors.

That equation has begun to change. Sustainability has become a strategic imperative for many investors, organizations exposed to biologically based activities, such as food, have gained attention as a destination for long term investment with the potential to benefit from the transformation of global food systems.

Sustainable investment is projected to reach US$53 trillion in 2025, with growing flows directed toward regenerative agriculture, agri-tech innovation, and nature-based climate solutions.[57] Investors are increasingly viewing food not only as a commodity, but as a lever to deliver returns across an organization's ESG agenda.

Sovereign wealth funds, motivated by both portfolio diversification and domestic food security imperatives, are investing directly in farmland, water infrastructure, novel foods, and vertically integrated agrifood systems. Philanthropic capital is catalyzing innovation in areas with uncertain near-term returns, such as synthetic biology and alternative proteins. Green bonds, carbon credit markets, and sustainability-linked loans are creating structured pathways for aligning finance with ecological outcomes.

However, critical gaps remain. Agricultural capital flows remain geographically concentrated, with limited deployment into smallholder systems or regions most vulnerable to climate disruption. A lack of investment products that are tailored specifically to some of the unique challenges facing the food system — such as weather exposure, land tenure issues, and generational succession of family assets and wealth — continues to hold back broader participation. The current capital architecture often fails to reflect the complexity and potential of the sector.

Transition finance is urgent given the impact the climate is already having on farming businesses around the world. Significant funding will be required to support farmers shifting toward regenerative practices, lower-emission models, and diversified land use. Digital platforms, agricultural real estate investment trusts (AgREITs), and fintech-enabled microcredit schemes are beginning to unlock new sources of capital for both industrial and community-scale actors.

Sustainable investment is projected to reach **US$53 trillion** in 2025, with growing flows directed toward regenerative agriculture, agri-tech innovation, and nature-based climate solutions.[57]

[57] Bloomberg Intelligence. ESG Assets Rising to $50 Trillion Will Reshape $140.5 Trillion of Global AUM by 2025., 2021

As capital markets increasingly price in climate and biodiversity risks, food system participants that embed resilience, transparency, and sustainability into their operating models will position themselves to retain and extend their access to finance. Those that do not may face tightening credit conditions, reputational scrutiny, and lost opportunity in a capital-constrained world.

**"The financial sector has a pivotal leadership role in driving food system resilience. By integrating ESG considerations into well targeted lending and investment decisions, we can channel capital towards sustainable agriculture, equitable food distribution, and innovative technologies. This isn't just about risk management, it's about proactively seizing opportunities to support a future food system that is equitable, profitable and sustainable all at the same time."**

**Richard Bernau**
Global ESG Lead, Banking & Capital Markets
KPMG International

## The emerging response

Leading agrifood businesses are reshaping their financial strategies to meet evolving investor expectations. Firms are adopting sustainability-linked financing, participating in carbon credit schemes, and co-developing blended finance models with development banks and impact funds.

Investment is flowing into transition pathways — from soil health to water conservation — backed by measurable ESG outcomes.

Organizations across the food system (from input providers, to food processors and retailers) are launching their own investment arms or incubators to support upstream innovation in regenerative farming, agri-tech, and circular economy models.

Engaging proactively with capital markets — not just as fundraisers, but as strategic partners — is enabling businesses to access patient capital, de-risk innovation, and strengthen long-term competitiveness in an increasingly sustainability-driven economy.

10

# Technological advances accelerate everything

Technology is not simply one of many forces reshaping the global food system — it is the catalyst accelerating all others. From climate adaptation and personalized nutrition to capital access and microbial resilience, technological innovation is redefining what is possible, collapsing timelines, and amplifying the urgency — and potential — of transformation.

The agricultural technology (agri-tech) sector is projected to reach US$22.5 billion by 2025[58] with innovations in robotics, satellite imaging, and IoT-enabled devices driving the emergence of high-resolution, data-centric agriculture. Precision farming tools are now enabling producers to optimize water use, fertilizer application, and pest control-cutting input waste while lifting yields. In regions vulnerable to climate stress, AI-guided climate forecasting and soil monitoring are becoming critical tools for safeguarding harvests, enhancing land-use efficiency, and providing new risk management solutions.

Meanwhile, automation and autonomous systems are reshaping the farm labor model. In response to rising wage pressures and workforce shortages, robotics are being deployed for everything from weeding to standardized harvesting.

Agricultural mechanization could reduce global labor needs by hundreds of millions of agri-food workers, with advanced scenarios lowering requirements to just 50 million agricultural work units,[59] transforming operational economics and rural employment.

A techno-economic assessment undertaken by the Good Food Institute estimates that cultivated meat could reach cost parity with some conventional meats by 2030, with production costs projected at US$2.92 per pound (US$6.43 per kilogram).[60] In parallel, precision fermentation and plant-based innovation continue to unlock new formats for sustainable, low-impact nutrition. As consumer awareness of the environmental and ethical costs of traditional protein grows, these technologies offer alternatives that align with evolving values.

Digitalization is also transforming trust, transparency, and consumer engagement. Blockchain style technologies are enabling end-to-end traceability, allowing retailers and consumers to verify the origin, handling, and sustainability credentials of food in real time. AI is being used to personalize product recommendations based on biometrics, lifestyle, and health goals — bridging the gap between nutrition and consumer expression. As consumers demand deeper insight and ethical assurance, digital tools are shifting the paradigm from supply chains to value chains.

The agricultural technology (agri-tech) sector is projected to reach

**US$22.5 billion by 2025.[58]**

[58] Juniper Research. Agtech Market Value to Soar, Reaching Over $22 Billion Globally, 2020
[59] Agricultural mechanisation could reduce global labour requirements by hundreds of millions of agri-food workers Vittis, Godfray & Obersteiner
[60] Good Food Institute, Reducing the price of alternative proteins, 2021

Technology is also revolutionizing how capital interacts with the food system. Fintech solutions are enabling microloans to smallholders, while digital marketplaces are creating new liquidity pathways for everything from carbon and biodiversity credits to regenerative grain contracts. Satellite and drone-based monitoring is allowing insurers and banks to better assess risk and price premiums accordingly, increasing access to capital for climate-exposed producers.

The *survey results* revealed a nuanced view: while respondents widely endorsed tech as essential, many also cautioned against one-size-fits-all solutions. Inclusivity and adaptability were recurring themes — especially from stakeholders in Africa, Asia, and Latin America — emphasizing the need for tech to be scaled to meet the diverse realities that different farming businesses face.

Importantly, the multiplier effect of technology means it accelerates every other trend — from reducing waste and enhancing microbial safety, to unlocking new models of global collaboration and enabling real-time policy responsiveness. Those who harness this acceleration will lead; those who lag will find their status quo outpaced by disruption.

## Bridging insight to action

The signals are clear. The global food system is at an inflection point — marked by intensifying resource constraints, rising stakeholder expectations, and the unprecedented power of new technology. From the competition for land and water to the moral challenge of inequitable food access, from the destabilizing impacts of extreme climate events to the threats to human and animal health from microbial resistance the demand for transformation not iteration is clear.

Solutions are available to many of the challenges the world faces, but the food system lacks the capability and resources to optimize them at the speed necessary. Change can be accelerated by new partners and collaborators, that bring creative thinking and the disruptive potential of capital and technology to the sector.

The insights shared throughout this report underscore a growing alignment around the need for resilience, equity, and regeneration. They also reveal divergent priorities, hidden tensions, and the risks of inaction. The decisions made now may shape not just the future of food — but the future of health, the economy, the environment, and society. They clearly signal that the future relies on collaboration.

The questions we pose in the next section challenge organizations to think about the opportunities they can unlock by collaborating with the food system, regardless of the sector of the economy they currently operate in.

**"Private enterprises have always been at the forefront of transformation — and today, they hold important keys to reshaping the future of the food system. Whether it's a founder pioneering climate-smart logistics or a family business deploying breakthrough agri-tech, the pace of innovation we're seeing is extraordinary. What sets these businesses apart is their ability to act fast, stay close to their communities, and scale solutions that are both commercially viable and socially meaningful. Technology is rapidly accelerating the rate that we can build more resilient, regenerative, and inclusive food systems."**

**Conor Moore**
Global Head of Private Enterprise
KPMG International

# Part three: What questions should you be asking?

Food systems are deeply connected to every aspect of our lives. They shape how we function individually, and the communities we form. They create the platform on which all other economic activity takes place. The demands being placed on global food systems are stretching their resilience with the adverse impacts on the health of both planet and people becoming obvious in recent years.

The coming years will see change rapidly accelerate in how we produce, process, distribute and consume food. It is likely that the extent and pace of change will exceed anything our food systems have experienced in the approximately 13,500 years since the first farmers began to formally cultivate crops for their communities. Given we rely on food systems to deliver the sustenance we need every day, this transformation (the food revolution) creates risk to not just those organizations in the food system but every business.

However, it also creates opportunities for businesses to derisk, diversify and differentiate themselves through the opportunities that unprecedented global transformation offers.

Organizations in the food system have been grappling with the changes coming for some time, many other organizations across the economy (that have been comfortable to leave the food system to farmers and processors) have spent little time thinking about how food impacts their business or the opportunities it offers for collaboration and growth.

**"Food system resilience won't be achieved by any one actor alone and cannot be left to farmers. It demands new — and radical — collaboration between all economic actors and across industries, supply chains, and borders."**

**Ian Proudfoot**
Head of Global Agribusiness
KPMG in New Zealand

The fundamental question to be answered for an organization operating in one or more food systems is have we done (or are we doing) what we need to do to ensure we have access to, and the uninterrupted ability to deliver to our customers, a resilient, sustainable supply of food into the future. Our work on risks facing global food systems and the organizations operating in those supply chains consistently highlights that factors including uneconomic farmers and growers, climate change, water shortages, and biodiversity loss represent the greatest risks to food system resilience.

This requires as much time to be spent enhancing the value that is created in the first mile of the supply chain as has traditionally been spent ensuring the last mile delivers effectively to the customer.

To support farmers and growers in mitigating climate and nature-related risks while ensuring their economic resilience, organizations must rethink their partnerships. This involves considering every aspect of their supply relationships to guarantee that essential food supplies continue to arrive, enabling them to consistently meet customer needs.

However, we believe that every organization should be thinking about how the resilience of future food systems will impact their future, the potential it offers for growth and roles they can take on to lift food resilience (simultaneously derisking their operations).

There are 10 further questions that we believe all organizations and their leaders should be asking, which will shine a light on potential opportunities and collaborations that have been overlooked as food has so often been taken for granted for years. These questions can also assist food related organizations to connect to all the disruption happening around them and recognize the potential this change creates for their business to evolve, diversify, accelerate, collaborate and, ultimately, thrive in the food systems that will emerge from this revolution.

**KEY:** Different members of an organization's leadership group may have a particular interest in asking and answering different questions, so we have color coded questions to indicate where interest may lie.

| | | | | |
|---|---|---|---|---|
| **Board** | **CEO** | **CFO** | **Innovation Leader** | **Strategy Leader** |
| **Risk/Legal Leader** | **Supply Chain Lead** | **Digital Leader** | **Sustainability Leader** | **People Leader** |

# Q.1 Consider the impact of food on our organization

**Do we understand the impact that the food system has on our business and how the failure of a critical food system in a key geography could impact operations and returns from that business and for how long?**

In today's connected world the breakdown of a food system in Southeast Asia could result in ingredients needed to create a product in Europe or the US not arriving (whether it's a food product, a piece of clothing, or a device with a bio-based component). The reality is that every business is exposed to the impact that food systems have on people and supply chains, yet the risks inherent in those systems are often overlooked despite the many vulnerabilities surrounding food production globally. Understanding which food systems are critical to those working in your organization and using your products and services will enable your food system risk to be properly articulated and will likely help to identify where a lack of food system resilience could compromise your organizations operations. It may also provide indicators of where opportunity lies for you in the global food system.

**CEO** | **Innovation Leader** | **CFO**

**Risk/Legal Leader** | **Sustainability Leader** | **People Leader**

# Q.2 Recognize new food futures in our strategic planning

**Does our future scenario planning account for major shifts in global food systems, including new breeding and growing technologies, digital and AI adoption, antimicrobial resistance, changing diets, demographic trends, system vulnerabilities, and geopolitical moves away from free trade?**

While the fundamental essence of farming has not changed in 13,500 years, (you take a biological species (plant, animal, fish), utilize equipment to cultivate it and apply knowledge to managing it through a growing cycle) the way these factors are integrated will look very different in the future with the innovation becoming available for food production. Historically, food systems have met demand through increasing land area and a consistent pipeline of evolutionary advances that has lifted productivity and yield (automation, genetic improvement, fertilizers, pest management). With expectations more food will be delivered, with better nutritional density and less impact on the environment food system innovation is entering a period of revolution that will undoubtedly create new opportunities, but also revealing new risks to food system resilience, both of which should inform future scenarios.

**Board** | **CEO** | **Innovation Leader** | **Strategy Leader**

**Risk/Legal Leader** | **Digital Leader** | **Sustainability Leader** | **People Leader**

# Q.3 Clarity on what is within and outside the control of our business

**Are we clear on what we can control, influence and steer across our value chains and where things are outside of our control but critical to our business? For the factors outside of our control, what can we do to better influence the outcomes that occur?**

Business has always been impacted by externalities that sit outside their control and influence. The historic dependence of the food system on climate has made farmers, processors and distributors experts in managing around the uncertainties they face. As climate uncertainty has increased the global food system has balanced this instability with a relatively benign geopolitical environment that has enabled it to flourish and meet growing demand. With geopolitical certainty being replaced with volatility and nationalism the range of factors outside an organizations control and influence is growing and the ability to plan through uncertainty is significantly harder. Being clear on what is within your control, what is most likely outside of your control and what can be influenced or steered in a collaborative manner at a sector or industry level is more important than ever in an increasingly volatile, uncertain, complex, ambiguous world.

**Board** | **CEO** | **Innovation Leader** | **Strategy Leader**

**Risk/Legal Leader** | **Supply Chain Lead** | **Digital Leader**

# Q.4 Understand how food interacts with our social license to operate and actively promotes our corporate citizenship agenda

**Do we understand where our social license to operate overlaps with key inputs into global food systems and is there the potential that our actions could be perceived to be constraining the ability of the food system to meet society's nutrition needs? Could our actions contribute to a lack of resilience of one or more food systems in the medium to long term?**

All organizations hold a social license to operate which implicitly establishes the boundaries within which society expects it to operate and engage with the community and the environment. The extensive, global nature of food production and distribution, the inputs required (for instance water and agri-chemicals), the use of sentient animals, and the deep connections every community has to food means food organizations have complex, nuanced social licenses granted by their communities. The wide extent of the industry's license creates intersections with the licenses held by countless other organizations, be they in the financial, energy, healthcare, manufacturing, technology, infrastructure or consumer sectors. These intersections can be points of conflict but can also identify opportunities for collaboration and opportunity for organizations to grow while enhancing the resilience of global food systems.

**CEO** | **CFO** | **Strategy Leader**

**Supply Chain Lead** | **Sustainability Leader** | **People Leader**

# Q.5 Investigate whether we have a technical solution relevant to the food system

**Have we explored where we can utilize our technology suite (be that digital, mechanical, intellectual or biological) directly, through platforms or in collaborative partnerships to improve the resilience and effectiveness of global food systems and the associated supply chains?**

At the core of the food system revolution is data. As rural connectivity improves it unlocking the ability to collect better and more extensive data which is creating opportunities for organizations to explore and adopt technologies and operating models unimaginable 20 years ago. The way technology is adopted in the food sector is different. The platforms used to access technology may be very different to those you have traditionally used, the risks associated with changing a biological system are high (the farmer often only has one crop a year making any change to how that crop is grown an enormous risk) meaning trusted advice is critical and any significant change has to be sufficiently rewarding to overcome the inertia of doing things largely the same way for decades. If you have a technology, have you fully explored new and alternative use cases that may exist for your technology in the global food system. Could your technology assist in making change more transparent and easier in food systems enhancing resilience and improving outcomes for society?

**CFO** | **Innovation Leader** | **Strategy Leader**

**Supply Chain Lead** | **Digital Leader** | **Sustainability Leader**

# Q.6 Influence regulatory outcomes to mitigate business risk

**Do we have a clearly articulated plan as to how we participate in securing regulatory outcomes that support our business goals? Does this recognize the importance of maintaining a resilient food system that feeds the communities that our organization interacts with?**

Regulators struggle to effectively regulate systems undergoing rapid change with the necessary agility to assist adoption of innovation while maintaining appropriate guardrails and protections. Food systems are inherently complex to regulate given they cut across so many regulatory silos (biosecurity, environmental management, water, food safety, market access, health etc.) creating risk for those in the system and the organizations that rely on it delivering a resilient food supply. As the ways that food is grown, processed, distributed and consumed rapidly evolve regulators in many jurisdictions have failed to keep pace creating inconsistencies and inefficiencies across the global food system. Good regulation is delivered by regulators that understand changes coming to the systems they oversee and the consequences that the regulatory settings they impose have directly and indirectly on those systems. This is particularly important when a regulation is being applied in a silo that is not directly part of a food system but influences the resilience of food systems. Engagement and collaboration in regulatory processes will shape more practical rules, enhance the resilience of food systems and create growth opportunities.

**CFO** | **Strategy Leader** | **Risk/Legal Leader**

**Supply Chain Lead** | **Sustainability Leader**

# Q.7 Explore energy and bioeconomy opportunities to diversify your business

**Are we exploring opportunities available to our organization to participate in bioenergy, biomaterials and other nature based circular economy businesses to diversify our product/service portfolio, create shareholder value and enhance the resilience of global food systems?**

Optimizing societal outcomes needs both the food and energy systems to be fully meeting the needs of the communities that they serve. Too often these systems are thought about as independent, and we have sought to optimize one independently of the other. However, they are inextricably linked. If we are to successfully decarbonize the energy system an important part of the answer lies within the farm gate utilizing the bioenergy that is grown and so often wasted in the byproducts associated with food and fiber production. Embedding a circular mindset into organizational thinking to identify opportunities to participate in biobased energy and materials solutions has the potential to reduce waste, enhance environmental outcomes, identify new opportunities for partnership, deliver an economic return while also enhancing food system resilience (through increasing farmers returns, enabling them to stay on their land by monetizing byproduct streams that have historically represented a cost). Failure to engage with circular opportunities could undermine the economic resilience of farmers and growers putting food system resilience at risk.

**CEO** | **CFO** | **Innovation Leader**

**Risk/Legal Leader** | **Supply Chain Lead** | **Sustainability Leader**

# Q.8 Reduce the impact of societal health challenges on your organization

**Do we understand the impact that non communicable diseases (such as heart disease, diabetes, obesity and cancer) have on the efficiency, cost base and outcomes delivered by our business and what are we doing to respond to these challenges?**

Many organizations are being financially impacted by the health challenges that face modern society, be it through lost productivity, inflated healthcare costs, increased absenteeism, and higher taxation. While food is not the sole contributor to non-communicable health epidemics it is widely recognized that diet is a significant contributor to the outcomes that society is now having to respond to. While it is hard for organizations to direct how their people live and interact with food there are many opportunities to influence their decisions in a positive way, with benefits for both company and its staff members. Understanding the impacts that health has on both business profitability and the health outcomes across the organizations team will clarify the key issues that an organization may need to lean into, the food system interventions best suited to their team and financial benefit that could be delivered.

**Board** | **CEO** | **CFO** | **Strategy Leader**

**Risk/Legal Leader** | **Supply Chain Lead** | **People Leader**

# Q.9 Allocate capital to participate in emerging opportunities in global food systems

**Do we monitor investment opportunities available in global food systems to participate in new income streams and mitigate risks to our business? Are we plugged into the right venture capital, startup and innovation ecosystems to identify opportunities that will support our strategic goals?**

Historically, weather volatility and low cash returns have made food and agriculture business unattractive investments meaning funding the sector has historically been left to the sector. This has left many farmers unable to fund innovation given the debt associated with their land and overcapitalized co-operatives unable to deliver on their purpose. The resilience of food systems has declined. Venture capitalists have come and gone, burnt by inflated prices on delivery companies and novel food start-ups. Capital is needed to facilitate the transformation of food systems to deliver better outcomes for society and the planet, yet it is a widely accepted unassailable truth that nobody is going to pay more for sustainable food. Our desire for cheap food today runs the risk of leaving us without food tomorrow. However, this creates an opportunity for innovators to bring new products and funding solutions to market, that accelerate the development and adoption of technology and support long term food resilience.

**Board** | **CEO**

**CFO** | **Sustainability Leader**

# Q.10 Uncover partners to introduce and connect you to the biggest opportunities

**Do we understand the food ecosystem in our key geographies and the individuals and organizations that we should be collaborating with to enable us to achieve existing goals, participate in emerging opportunities and reduce our exposure to food system failure?**

The food system already contributes to the outcomes your organization achieves and the lives that each of your employees is leading. The transformation that has started and will accelerate over the coming years will reshape food systems in many ways to deliver food that better suits our lifestyles today through the utilization of cutting-edge technologies, many of which have never been deployed in the sector. The food revolution requires knowledge, skills and technologies that are new to the sector which creates opportunities for unusual and radical partnerships and collaborations that deliver benefits to both the partners and the wider community (through a more resilient food system). Taking the time to understand who-is-who in the food ecosystems that your business interacts with and what their organizational needs are is likely to valuable investment of your time at this point in history.

**Board** | **CEO** | **Innovation Leader**

**Risk/Legal Leader** | **Supply Chain Lead** | **Digital Leader**

# Examples in action

## Nature, climate and circularity

### 1 Enriching food production and ecosystem regeneration with circular collaboration

Nestled in Australia's New South Wales, Bega Valley exemplifies circular collaboration, demonstrating how rural communities can successfully balance agricultural productivity, ecological sustainability, and economic resilience. Under the ambitious 'Bega Circular Valley 2030 initiative', the local government, businesses, farmers, educational institutions, and financial partners collaborate closely to embed circular principles across the region.

A central pillar is the organic waste recovery system, processing over 5,000 tons of food and farm waste annually into compost. This effort revitalizes 3,200 hectares of farmland, raising soil organic matter by 25 percent and improving water retention by 15 percent, significantly reducing irrigation needs and enhancing drought resilience. Complementing this, the 'Milk to Market' program converts methane from dairy farms into biogas, powering 80 percent of local farms and reducing emissions by 40 percent. Additionally, over 2,000 tons of whey from cheese production, previously discarded, are repurposed into animal feed and protein supplements, eliminating nearly all production waste.[61]

Restoration is equally prioritized, with 500 hectares of native vegetation providing habitats for endangered species and increasing carbon sequestration by 20 percent. This in combination with improved land management practices have cut nutrient runoff by 30 percent, supporting aquatic ecosystems.

This transformation is financed through diverse public-private sources, including a 14 million Australian dollar (AUD) NSW Government investment establishing the Centre for Circularity, and annual contributions of up to AUD1.1 million from the Bega Group's Better Farms Program. Alliances with organizations like KPMG Australia and a leading global financial services provider through the Bega Valley Innovation Hub provide essential expertise and seed funding.

Bega Valley exemplifies the powerful impact achievable when coordinated efforts, diversified financing, and multi-sector collaborations converge around circularity offering replicable blueprint for sustainable regional transformation at a community scale.

A central pillar is the organic waste recovery system, processing over

**5,000 tons**

of food and farm waste annually into compost.

[61] Bega Circular Valley (2025)

## 2 Delivering carbon-negative outputs with insect-based circular systems

A trailblazer in sustainable innovation, Canadian-based Entosystem has the capacity to transform 90,000 tons of food waste annually into animal feed and plant nutrition ingredients as part of its pioneering circular food model.[62] At the heart of its carbon-negative process is the black soldier fly; its larvae capable of growing 10,000 times in mass by consuming grocery store leftovers and landfill-bound materials. Contaminants such as plastic and metal are removed with 99.7 percent precision prior to bioconversion, with residuals diverted for energy recovery to ensure near-complete circularity.

Through proprietary breeding techniques, Entosystem doubles the egg-laying capacity of female flies, accelerating production cycles and boosting protein yield. The larvae are processed into hypoallergenic animal feed; their manure, or 'frass', becomes a proven biofertilizer, backed by US$1 million in crop efficacy trials.

Behind it all are over US$70 million in public and private investments to date; investments that remain critical to enabling Entosystem's rapid expansion goals. Its strategic partnership with a waste recovery and processing leader has been the key to the business's success to date. The partnerships are accelerating Entosystem towards the company's vision of launching 10 sites across North America by 2035 — underlining the potential of converting environmental liability into agricultural and commercial value, at scale.

As climate pressures mount and traditional feedstocks grow less sustainable, Entosystem's model presents a high-efficiency, low-emissions alternative: one that increases food system resilience while reducing the carbon footprint of modern agriculture.

## 3 Catalyzing a sustainable future — the journey to low-carbon ammonia

Fertilizers play a central role in global food security, underpinning the nourishment of nearly half the world's population. Synthetic nitrogen fertilizers, in particular, have significantly boosted crop yields, supporting food production for billions. However, their production and agricultural application are responsible for a substantial volume of greenhouse gas emissions. All nitrogen fertilizers are derived from ammonia, and ammonia production and use in agriculture together account for approximately 3 percent of global $CO_2$ emissions.[63] Fertilizers are therefore at the nexus of efforts to enhance food production and mitigate climate change.

On the fertilizer production side, low-carbon ammonia emerges as a pivotal solution in this context. Blue ammonia integrates permanent carbon capture and storage into conventional production processes, while green ammonia utilizes renewable energy to produce hydrogen, subsequently synthesized into ammonia. On the fertilizer application side, improving nitrogen use efficiency through more responsible nutrient management and integrating enhanced efficiency fertilizers can significantly reduce field emissions of greenhouse gases.

The transition to low-carbon ammonia production faces key hurdles, including high production costs, limited infrastructure, and challenges to scalability. Addressing these barriers will likely require coordinated efforts across sectors, investment in innovation, and supportive policy frameworks. Ammonia producers also have the more immediate option to adopt Best Available Technologies to improve energy efficiency and reduce emissions in existing ammonia production facilities.

Low-carbon ammonia are being piloted across other industries. In maritime shipping — which accounts for nearly 3 percent of global $CO_2$ emissions[64] — it is being explored as a zero-carbon fuel alternative. The aviation industry is investigating ammonia-based fuels to reduce its carbon footprint, and its high energy density makes it a candidate for energy storage solutions, facilitating the integration of renewable energy into power grids.

The International Fertilizer Association (IFA), representing over 500 industry organizations and 80 percent of global fertilizer production, recognized the potential of this technology and its diverse benefits. In collaboration with the International Energy Agency (IEA), IFA developed the Ammonia Technology Roadmap, outlining pathways to reduce emissions in ammonia production. It allowed countries like Egypt and Turkey to develop their own local Low Carbon Pathways, adapting the global framework to national contexts and priorities. This has been complemented by a green ammonia discussion series delivered alongside the Rocky Mountain Institute (RMI), and a global startup competition focused on innovations in energy-efficient ammonia production.

Cross-sector collaborations, industry associations, and other partnership models offer avenues to share best practices and support broader sustainability goals. By leaning in and engaging with these initiatives, companies may more effectively direct their resources towards pre-competitive challenges that deliver broader benefits.

[62] Inauguration of new facilities in Drummondville — Entosystem emerges as a world leader in insect production" Entosystem (2023)
[63] International Fertilizer Association, (2025)
[64] How real-time emissions tracking can help decarbonize the maritime industry, World Economic Forum (2025)

# Consumers, health and equality

## 4 Turning surplus food into a tool for public health, dignity and resilience

One of the UK's leading surplus food redistributors, FareShare works with over 8,000 charities and community groups to get edible food, otherwise destined to join the country's 4.6 million tons of annual food waste, into the hands of those who need it most. From children getting free school breakfasts, to people experiencing homelessness getting a hot meal and access to vital services, the charity supports over one million people every year.[65]

With 35 regional hubs, 18 delivery partners and relationships with a wealth of community organizations and major retailers, FareShare has evolved over 30 years to become a deeply collaborative, data-driven national network. It moves fast to collect, repackage and deliver a range of surplus food, leveraging its proprietary technology stack of CRM, BI and in-house warehouse management systems to align real-time food allocation with local need.

It's a model that empowers hyper-local solutions. In South London, surplus food supports mental health and addiction recovery services. In the remote Scottish islands of Orkney and Shetland, regional partners deliver fresh produce via ferry. In local schools, food is combined with cookery classes for parents and children, providing valuable life skills alongside nutritional meals.

The charity's impact extends far beyond access to nutrition. Delivering to organizations that support the homeless, elderly, victims of domestic abuse and addiction, and low-income families, FareShare uses food to help provide support, helping to build and strengthen communities across the UK. In 2023, the charity redistributed 128 million meals across the country while simultaneously preventing 95,000 tons of $CO_2$ emissions and 124 billion liters of water from waste.[66]

FareShare's work goes beyond hunger, too. Helping to reduce the pressure on overstretched public services by addressing the nutritional root cause of poor health, every British pound donated provides up to five meals — showcasing exceptional efficiency and proving that food redistribution is not just about logistics, but equity and impact.

[65] Annual Report, FareShare (2023)
[66] Annual Report, FareShare (2023)

## 5 The new health paradigm: How GLP-1 drugs are rewriting the future of food

A new frontier is emerging at the intersection of medicine, nutrition, and consumer behavior — driven by the rapid adoption of GLP-1 receptor agonists such as semaglutide and tirzepatide. Initially prescribed for type 2 diabetes, these medications are now fueling a global weight loss revolution by curbing appetite and reducing calorie intake by up to 30 percent.

But the ripple effects go far beyond pharmaceuticals.

A report by KPMG in the US, Getting to know GLP-1 users, a new kind of consumer, shows that GLP-1s are catalyzing a radical shift in how consumers eat — and how food companies must respond as a result. With appetite suppression driving down volume-based consumption, there is a growing demand for food products that deliver more value per bite: nutrient-dense, functional, and medically aligned. The days of indiscriminate snacking can be expected to give way to intentional eating, where foods are chosen not just for pleasure, but for therapeutic outcomes.

This evolution is already beginning to reshape supply chains and marketing strategies alike. Proactive food brands are now pivoting from supermarket aisles to clinical pathways, developing evidence-backed products that fit within care protocols. The rise of business-to-doctor models is accelerating, as healthcare professionals begin to prescribe specific foods — like oats for cholesterol, leafy greens for blood pressure, kiwifruit for digestion, and fermented foods for microbiome health — based on clinical research, not just dietary tradition.

Insurance-backed "produce prescription" programs are expanding in the US, enabling patients to access prescribed quantities of whole foods such as legumes, berries, and dark leafy vegetables as part of chronic disease management. These interventions blur the line between food and medicine, opening new revenue models for producers aligned with healthcare outcomes.

The next leap lies in personalization. As digital health diagnostics and wearables unlock detailed insights into microbiomes, genetics, and blood biomarkers, clinicians are beginning to prescribe nutrition as precisely as pharmaceuticals. Food innovators are racing to meet this moment with traceable, precision-formulated products tailored to individual health profiles.

For the food industry, the implications are transformative. Brands that succeed in this new era will not just sell products — they'll deliver outcomes. The supermarket is no longer the final battleground. Relevance, influence, and growth will increasingly be won in clinics, with doctors and care teams acting as gatekeepers to consumer trust.

Food is no longer just fuel. It's becoming a prescription.

# Scaled Impact

## 6 A collaborative approach to rapid technology uptake

Founded in 2016 by five pioneering startups, La Ferme Digitale has grown into France's leading agritech and foodtech association, now representing over 150 member companies. Its core mission is to accelerate the adoption of technology across the entire agricultural value chain — from automation and data analytics to alternative inputs and farm management platforms. In doing so, La Ferme Digitale plays a vital role in modernizing French agriculture, making it more resilient, productive, and environmentally sustainable.

The association's impact is built on collaboration. Its partnerships with public institutions like INRAE (the French National Research Institute for Agriculture, Food and Environment), research networks, and corporate stakeholders help fast-track the development and scaling of new technologies. A notable example includes the use of AI-powered crop monitoring in Bordeaux vineyards, which achieved a 30 percent reduction in pesticide use across 500 sites without compromising yields.[67] This is an opportunity not only to mitigate microbial resistance but illustrates the potential of digital tools to optimize other chemical inputs and improve farm profitability.

La Ferme Digitale's members span a wide spectrum of innovation. For example, one company has scaled its autonomous weeding robots to over 5,000 farms across Europe, slashing herbicide use by 80 percent while significantly reducing labor demands. Other members are transforming traceability, animal health, supply chain logistics, and carbon measurement.

Through major events like the Salon International de l'Agriculture, which welcomed 20,000 participants in 2022, and strategic alliances like its 2023 collaboration with KPMG in France, La Ferme Digitale is cultivating a collaborative ecosystem that connects startups, researchers, farmers, and policy leaders to accelerate sustainable agricultural transformation at scale.

### France's leading event dedicated to agricultural and food innovation

For the ninth consecutive year on 17th June 2025, La Ferme Digitale unites leading French and international stakeholders during its "LFDAY" www.lfday.fr event to foster synergies, spark visionary discussions, and co-create solutions that shape the future of agriculture. An opportunity to connect and engage with key players in French and European agricultural innovation.

A notable example includes the use of AI-powered crop monitoring in Bordeaux vineyards, which achieved a

**30 percent**

reduction in pesticide use across 500 sites without compromising yields.

[67] La Ferme Digitale (2025)

## 7 Sustainable finance for the future of agriculture

KPMG's Sustainable Finance Revolution report highlights how banks are increasingly turning to sustainable agriculture finance as a strategic lever for climate resilience, food security, and long-term profitability. With agriculture contributing 12 percent of global emissions and facing rising climate risks, financial institutions are reimagining their role — not just as lenders, but as enablers of transformation across the food system.[68]

Banks are now deploying sustainability-linked loans, blended finance models, and investment platforms to support regenerative practices, improve soil health, and reduce emissions. In New Zealand, the Bank of New Zealand has introduced sustainability-linked loans that reward farmers for meeting environmental and social targets, including biodiversity enhancement and water quality improvements.[69] In the UK, Lloyds Bank partnered with the Soil Association Exchange to help 1,000 farmers assess and improve their ecological footprint, covering soil carbon, animal welfare, and community impact.[70]

In 2024, Santander and Atitlan launched Atgro, a 500 million euro (EUR) global investment platform focused on sustainable agriculture. Its first projects include 3,000 hectares of pistachio trees and 5,000 hectares of vineyards in Peru, with a focus on superfoods and regenerative farming.[71,72] These investments are designed to boost yields, restore ecosystems, and create long-term value across the agrifood chain.

KPMG's report highlights that agricultural finance is evolving beyond traditional input loans to encompass a full value chain approach — from precision irrigation and drought-resistant crops to traceability systems and farmer training. This shift is being driven by regulatory standards, consumer demand for ethical sourcing, and the need for climate adaptation. Global alliances like the Tropical Forest Alliance are also working with banks and agribusinesses to eliminate deforestation from commodity supply chains, aligning finance with nature-positive outcomes.

By embedding sustainability into credit decisioning and risk management, banks are positioning themselves as catalysts for agricultural transformation. These efforts are not only reducing emissions and improving resilience but also unlocking long-term revenue potential in one of the world's most essential industries. As sustainable agriculture becomes a mainstream investment theme, financial institutions that act early are likely to benefit from stronger portfolios, enhanced brand trust, and a more secure global food system.

In the UK, Lloyds Bank partnered with the Soil Association Exchange to help

**1,000 farmers**

assess and improve their ecological footprint, covering soil carbon, animal welfare, and community impact.

68 Sustainable Finance Revolution, KPMG, 2024
69 BNZ Business Banking, "Sustainability Linked Loans" (2024)
70 Lloyds Banking Group, "Lloyds Bank launches sustainability support for agriculture sector" (2022)
71 Santander, "Santander and Atitlan launch Atgro, a platform for investing over EUR 500 million in agricultural projects" (2024)
72 Qorus Global "Santander and Atitlan launch Atgro, a €500 million agricultural investment platform" (2024)

# How KPMG can help

KPMG is uniquely positioned to support organizations in navigating and transforming the future of food. From farm to finance, policy to packaging, our global network of multidisciplinary professionals brings deep sector expertise, cutting-edge technology, and strategic foresight to help clients unlock resilience, create value, and lead systemic change.

### Strategy and foresight

Our Futures and Foresight teams help clients anticipate disruption and prepare for emerging risks and opportunities across the food system. Through scenario modelling, geopolitical analysis, and ESG benchmarking, we support leadership teams in designing adaptive strategies aligned with long-term value and resilience.

### Sustainable supply chain transformation

We help businesses redesign supply chains to improve transparency, reduce emissions, manage climate risks, and enhance traceability. Our supply chain optimization, decarbonization roadmaps, and circular economy solutions help ensure systems that are both commercially agile and environmentally aligned.

### Capital and finance innovation

KPMG works with investors, development banks, and agribusinesses to structure innovative financing models — including green bonds, sustainability-linked loans, carbon market participation, and blended finance platforms. Our corporate finance and impact investment teams help clients unlock capital flows for regenerative transitions and nature-based solutions.

### Regulatory navigation and policy influence

We advise public and private sector leaders on evolving regulatory frameworks affecting food, climate, and sustainability. From compliance to strategy, we enable organizations to engage constructively with global regulations and actively shape the policy environments critical to their future.

### Technology integration and digital transformation

Our Digital & Innovation practices work at the intersection of food and technology — delivering AI-enabled forecasting, blockchain traceability, and smart farming solutions. We also help scale agrifoodtech platforms and digital twin capabilities to improve productivity, resilience, and consumer trust.

### Collaboration and ecosystem building

We facilitate multi-stakeholder coalitions across sectors, including energy, healthcare, infrastructure, consumer, retail and agriculture to build integrated solutions to systemic challenges. Our convening power and cross-sector networks help align incentives, share risks, and deliver collaborative impact.

### People, culture, and capability development

Through leadership development, workforce upskilling, and ESG culture transformation, we help organizations build internal capacity to lead in an era of rising stakeholder scrutiny and evolving consumer values.

### Global tax strategy and trade advisory

In an era of shifting geopolitics and regulatory complexity, tax and trade strategy have become central to food system resilience. We help businesses navigate international tax regimes, optimize supply chain structures, and respond to evolving tariffs and trade barriers. Our specialists advise on R&D tax incentives, transfer pricing, and cross-border compliance to unlock value and reduce exposure.

Whether you're a farmer cooperative, food manufacturer, technology innovator, financier, or policymaker, KPMG can help you move from insight to action. Together, we can reimagine and help build a food system that delivers for people, planet, and profit — resiliently and equitably.

# Methodology

To better understand the priorities, aspirations, and visions of senior executives across industries directly shaping the food systems future, KPMG undertook a comprehensive global leaders survey in December 2024 with over 200 people responding via in-depth interviews. The subsequent qualitative findings go beyond the obvious, uncovering nuanced perspectives and unexpected insights that reveal the complexity of reimagining how we produce, distribute, and consume food.

## Who responded?

The survey engaged a broad spectrum of respondents, including professionals from agriculture, technology, retail, healthcare, finance, and energy sectors. Participants ranged from senior leaders and mid-level managers to junior professionals, offering perspectives shaped by varying levels of experience and decision-making influence. Geographically, the survey captured insights from regions across the globe, with particularly rich input from Europe, Africa, Asia Pacific, and North and South America. This diversity allows for a multifaceted understanding of the global food system's challenges and opportunities.

## What questions were asked?

The survey was designed to explore three core themes:

1. **Outcomes:** What are the most important results the global food system should deliver?
2. **Actions and aspirations:** What actions must be taken to achieve these outcomes? Respondents were encouraged to consider topics like business model innovation, investment priorities, and regulatory needs.
3. **Vision:** What does the future of the global food system look like? Participants shared their long-term hopes and the principles they believe should guide transformation.

This qualitative exploration offered respondents the freedom to share detailed, open-ended responses, both mitigating biases and allowing for a 360 degree view from our respondents, resulting in a rich tapestry of ideas, reflections, and challenges.

## Why this matters

Understanding stakeholder perspectives is essential for addressing the complexity of the global food system. These responses provide a roadmap for action, shedding light on shared priorities, regional disparities, and sectoral differences. They also challenge conventional wisdom, offering fresh insights into the tensions and opportunities that lie ahead.

## Qualitative research and expert interviews

To further enhance the report, we conducted a series of qualitative interviews with KPMG clients and subject matter experts. This included in-depth discussions with agricultural experts, as well as sector-specific KPMG specialists in Energy, Infrastructure, Government, and ESG.

Our qualitative research aimed to uncover nuanced challenges and opportunities within these sectors. Additionally, desk-based research was performed to analyze the current and future state of the food system.

# About the authors

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Ian Proudfoot leads the Agribusiness line of business for KPMG in New Zealand. He works globally with clients across the food system on the future of food and has been the lead author of the KPMG Agribusiness Agenda since 2010. Ian has been appointed to various Ministerial advisory groups relating to the food and fibre sector in New Zealand and led the secretariat of the Mana Kai Initiative, a major cross-sector initiative exploring the foundations for a resilient food system in New Zealand. Ian provides audit services to agribusiness and consumer markets clients and leads the ESG Assurance business in New Zealand.

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Isabelle Allen is the Global Head of Consumer and Retail at KPMG, bringing more than 30 years of international experience to the industry. In her role, she drives KPMG's global investments and thinking around the future of the sector, focusing on the systemic forces reshaping industries — including global macro-economic and geopolitical trends, the use of innovative technologies, disruptive entrants and emerging consumer behaviors.

She is a key voice in bringing industry-wide challenges to the forefront of global dialogue, helping organizations understand their role in addressing complex, interconnected issues such as food system resilience, supply chain transformation, and the evolving relationship between business and society. Isabelle works across KPMG's global network of 25,000+ sector professionals and global alliance partners to drive forward-thinking solutions that are commercially sound and socially responsible.

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Mike leads KPMG's climate change and decarbonization sector where he has responsibility for leading KPMG firms' work on the provision of decarbonization and climate risk solutions for their global clients across all sectors. As part of this work, Mike is actively involved in delivering decarbonization services around areas such as climate risk, climate strategy, carbon markets and energy transition for clients in many different sectors. Notably, he provides strategic guidance to private equity firms, asset managers, financial services groups and electric utilities.

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