Reimagining the food system through social innovations

Food systems require urgent and profound transformation to become sustainable, both in Europe and worldwide. Social innovation plays a pivotal role in transforming today’s food systems into ones that are economically and socially feasible, and sustainable within planetary boundaries. This briefing presents the results of a systematic examination of emerging social innovations across the food chain, conducted using horizon scanning, a tool to detect early signs of potentially important developments. It offers insights into the experimentation taking place in alternative ways to produce, trade and consume food.

Key messages

The emerging issues identified through horizon scanning illustrate that change towards a sustainable food system is under way across Europe. However, this change can and must be accelerated.

Diverse social innovations are proliferating across the food chain, opening up opportunities for change. They include the development and testing of new foods, products, services, and business and governance models. The innovations vary in maturity and novelty and are usually enabled by new technologies and partnerships.

The emerging issues identified exemplify the types of innovations that should be encouraged as we phase out unsustainable models of producing, trading and consuming food. Nevertheless, as with all forms of innovation, their ultimate environmental, social and economic impacts are uncertain.

For policymakers, understanding what social innovations are emerging, who is driving them and their potential impacts are key first steps towards taking action that contributes to developing sustainable food systems.
Food: an essential ingredient for sustainability

Food systems hold the power to realise our shared vision for a better world.

António Guterres, United Nations Secretary-General (UN, 2021)

Food shapes our cultures and identities, underpins our economies and influences how we relate to the natural world. The complex food systems (Box 1) that deliver food to our table involve a myriad of actors and are closely tied to food and nutrition security, ecosystem health, social well-being, public health (EEA, 2017) and strategic autonomy (EC, 2021a). Food systems are central to achieving the United Nations Sustainable Development Goals (SDGs) by 2030 (UN, 2021) and are a key leverage point for ensuring that humanity can thrive within planetary boundaries (EEA and FOEN, 2020). While providing key services and meeting vital societal needs, food systems today are also responsible for a third of global greenhouse gas emissions (Crippa et al., 2021), loss of biodiversity, ecosystem degradation (Benton et al., 2021) and impacts on human health — including malnutrition, diet-related obesity and diet-related non-communicable diseases (Willett et al., 2019). Food systems also play a role in social injustices and power imbalances (EEA, 2017; IPES-Food, 2019; SAPEA, 2020). Urgently transforming today’s food system is therefore a cornerstone for sustainability in Europe and worldwide (IPES-Food, 2019; Willett et al., 2019; SAM, 2020; SAPEA, 2020; Bock et al., 2022).
A food system includes all the elements (environment, people, inputs, processes, infrastructure, institutions, etc.) and activities that relate to the production, processing, distribution, preparation and consumption of food. It also encompasses the outputs of these activities, including their socio-economic and environmental impacts (HLPE, 2014). Food systems are complex, adaptive, multi-actor, multi-level and multi-functional systems that exhibit non-linear dynamics such as trade-offs, synergies and feedback loops (EC, 2021b). They are shaped by economic, environmental, political, technological and social factors, including cultural norms and lifestyles (EEA, 2019a).

In Europe, the transition towards a fair, healthy, resilient and environmentally friendly food system is at the heart of the European Green Deal. It is central to achieving the EU’s climate neutrality, zero pollution, circular economy and biodiversity targets. By adopting the farm to fork strategy (EC, 2020a), the European Commission has committed to creating a sustainable food system that safeguards food security and protects people and the natural world. The strategic importance of the food system for Europe’s food security, resilience and strategic autonomy has been brought to the fore by recent shocks — namely the COVID-19 pandemic and Russia’s war in Ukraine.

Fostering innovation throughout society

The transformation of production and consumption systems towards social, economic and environmental sustainability is inherently uncertain and presents enormous societal challenges. To achieve far-reaching, systemic change, we need fundamental shifts in lifestyles and patterns of consumption and production. These changes are likely to disrupt existing investments, jobs and power structures (EEA, 2019a,b, 2021a). They will also require new forms of participatory and reflexive governance to navigate uncertainties and manage trade-offs, interdependencies, inequalities, power dynamics and conflicting perspectives (EEA, 2019b; EC, 2021b). Moreover, we need new spaces, such as research and innovation labs or demonstration projects, to co-produce and experiment with new ways of doing, thinking and organising (EEA, 2019b).
A growing body of research points to innovation’s critical role in driving transitions (EEA, 2019b). Social innovations (see Box 2) are particularly important for sustainability transitions, offering novel ways to respond to problems, address unmet societal needs and deliver public services (EEA, 2021c; EIC, 2021).

### Box 2. The concept of social innovation

Although there is no single definition, **social innovation** can be described as ‘the development and implementation of new ideas (products, services and models) to meet social needs and create new social relationships or collaborations’ (EC, 2013). Anyone can act as a social innovator — civil society, businesses, governments and academia.

Social innovations often function as seeds of change and offer ideas and inspiration that can be adopted in the mainstream. They can also challenge, alter and/or replace dominant practices and related institutions in a specific social context (Avelino et al., 2019; Pel et al., 2020). Nevertheless, their transformative potential can often be judged only retrospectively.

The European Commission recognises that social innovation and entrepreneurship can help to tackle pressing societal challenges, create jobs and promote social inclusion. Over the past decade, the EU has been working to enable the creation, uptake and scale-up of socially innovative solutions through policies and funding instruments. These include the Employment and Social Innovation (EaSI) strand of the European Social Fund Plus (ESF+), research and innovation programmes such as Horizon 2020/Horizon Europe (EIC, 2021) and incentives for changemakers like the European Social Innovation Competition. European citizens want the food system to change, too: a recent survey of 2,000 Europeans aged 18-24 found that 78% demand urgent action to be taken to make the way we produce and consume food more sustainable (EIT, 2021).

A growing body of research (e.g. IPES-Food, 2019; SAPEA, 2020) highlights that social innovation has a particularly important role to play in transforming Europe’s food system. Social innovations are spreading in the food system, including those related to shorter food supply chains, community-supported agriculture, urban farming, plant-based nutrition, public procurement schemes, food waste solutions, food education and community-building initiatives. According to IPES-Food (2019), these initiatives have the potential to reduce environmental and climate impacts and help small-scale producers and food businesses realise a fair value for their products. They can also re-establish direct relationships between producers and consumers, citizens and local policymakers in a way that reinforces democracy, accountability and public trust.
Yet, as with all forms of innovation, the environmental, social and economic impacts are uncertain (EEA, 2019b; EEA, 2021b). In other words, we cannot say that social innovation is inherently ‘positive’ — even though it has potential.

What’s on the menu? Exploring emerging social innovations using horizon scanning

To better understand which social innovations are emerging in Europe with the potential to disrupt elements of the established food system, the EEA undertook a systematic horizon-scanning project (Box 3) with support from research partners and the Eionet Foresight Group.

Box 3. Horizon scanning — a foresight tool

Horizon scanning is a foresight tool used to systematically scan or review various sources to detect early signs of potentially important developments. These developments are often at the edge of current thinking, such as weak (or early) signals, wild cards, emerging issues and trends. A set of criteria is used to guide searching and filtering. The time horizon can be short, medium or long term (EC, 2015).

Foresight is the discipline of exploring and anticipating the future in a structured and systemic way. Its purpose is to help build and use collective intelligence to anticipate developments and shape the future we want (EC, 2021c).

The EEA’s horizon-scanning project combined web mining with a filtering and validation process, using machine learning and human evaluation. The exercise identified over 240 weak (or early) signals from a variety of news articles, blogs and grey literature published in English[2] between 2017 and 2021. The signals were aggregated into 24 closely related subsets, with each cluster hinting at a potential emerging issue (see Figure 1).
Next, 21 representatives from civil society organisations, business, academia and government discussed these issues at a sense-making workshop in September 2021.

Following the workshop, 10 emerging issues were prioritised for characterisation. The characterisation was based on desk research and 11 semi-structured interviews with experts in the field. The goal was to begin to understand:

- the driving forces behind the emerging issues
- the actors involved
- the potential consequences (risks and opportunities) for the environment and food system sustainability
- the key uncertainties that could affect an issue’s emergence and diffusion.

The 10 selected emerging issues include developments in new foods, products, services, and business and governance models. These issues have often been enabled by existing technologies and new forms of local partnerships, involving a variety of engaged stakeholders. They vary in their degree of maturity and novelty: some are relatively new developments, while others lend new perspectives to known subjects. Moreover, some provide new combinations of existing elements, while others are niche practices beginning to filter into the mainstream.
1. Agroecology: a way of producing food and living, a science and a movement for change

Over the years, agroecology has expanded in scale from the plot or field to encompass the whole food system. As a science, technique and social movement, agroecology is driven by demand for socio-ecological change. It is centred around the idea that we need to move from our current, intensive agricultural model towards a more holistic and ecologically driven production model.

Plenty of examples of agroecology exist in Europe. For instance, in 2012, the French government launched the agroecology project: a public policy initiative involving all key partners in the sector. This ambitious project aims to align agriculture with economic, environmental and social performance. It also aims to roll out agroecology to the majority of French farms by 2025.

Enabling co-creation, empowering farmers and recognising their local and traditional knowledge lie at the heart of agroecology. Re-establishing direct relationships between producers and consumers is equally important. In recent years, the integrated approach and paradigm shift proposed by agroecology has gained institutional attention and policy relevance worldwide. Agroecology holds great potential to create more sustainable and equitable food systems; however, its scalability remains to be seen.

2. Soulful soil: alternative methods for nutrient and pest management

Driven by rising input costs and increasing awareness of their negative effects, farmers are exploring novel ways to reduce and optimise chemical pesticide and fertiliser use. To do so, they are embracing techniques ranging from agroecological approaches to precision agriculture. For example, the FertiCycle consortium is an initiative created by partners from the European fertiliser industry, the University of Copenhagen and a range of leading European universities. The consortium is developing a new model for fertiliser production, based on circularity and recycling organic waste, to produce high-quality, bio-based fertilisers.

However, using alternative methods for nutrient and pest management is still niche in the EU. Barriers to adoption include the risk of lower yields, the cost of transitioning, limited advice and knowledge gaps. Giving farmers the resources to access independent advice can counter these barriers: this way, they can develop knowledge and skills in alternative nutrients and pest management practices. Similarly, promoting cooperation among farmers, as well as partnerships between universities and farmers, is essential for supporting knowledge sharing and minimising the
risks of transitioning from conventional agriculture.

3. The power of many: community-supported agriculture networks and initiatives

Today, European citizens are becoming more and more aware of the deep ecological crisis we are facing. As a result, many are willing to help create a fair, transparent and sustainable food system. This includes paying increasing attention to community-supported agriculture (CSA) models, where citizens and farmers enter into partnership and share the responsibilities, rewards and risks of running agricultural activities. For example, Eco Ruralis — the Romanian member of international farmers’ organisation La Vía Campesina — unites various families, farmers, organic producers and agricultural activists. It also promotes food sovereignty and peasants’ rights.

CSA initiatives present an opportunity to transform the current food system by providing alternative structures. Although CSA initiatives have been around for decades, a few novel aspects are emerging: the consolidation of prosumer business models, the implementation of regenerative agricultural practices, and the creation of digital platforms for networking and collaboration, knowledge exchange and crowdfunding.

4. Food-growing cities: urban farming, integrated food policies and citizen involvement

The ‘food-growing cities’ emerging issue refers to two distinct but interrelated phenomena, with both technological and social innovation playing a role. First, urban farming initiatives are blossoming. These include home and community gardening, vertical farming (growing crops in stacked layers) and indoor cultivation systems. Indoor cultivation systems apply new means of production (such as hydroponics and robotic technology) and innovative business models, including direct sales to consumers and cooperatives, focused on community impacts. Second, municipalities are increasingly involving everyone from citizens and start-ups to whole industries in devising and implementing integrated policies. These policies connect food and agricultural issues to other challenges, including climate change, health and nutrition, social inclusion and spatial planning.

For instance, Ghent’s Spinning Pig is a sustainable, citizen-driven project that integrates pigs into the Belgian city’s life. The pigs are fed with local food waste, processing up to 5,000 kilograms of waste over 6 months. Once the pigs are slaughtered, they are sold as ecologically responsible meat to locals. The project also acts as a social binding agent: farmers and locals alike help to run the project.
The main novel aspect is that a new discourse on systemic and sustainable food policies is being adopted. In tandem, new governance systems and funding mechanisms are being created across a broad range of city departments that traditionally operate as silos. However, the extent to which ‘food-growing cities’ will contribute to food production and security in the future remains uncertain.

5. Muscle-up: alternative protein sources for human consumption

A shift towards plant-based diets has increased demand for alternative proteins, spurring research and investment into three different types of products. Over the last 10 years, leading meat processing companies have developed their own plant-based substitutes and are currently experimenting with marketing ‘meatless’ alternatives to meat eaters who are embracing a flexitarian diet. For instance, Spanish start-up NovaMeat claims it has developed the world’s first 3D-printed, plant-based beef steak that looks like a whole beef muscle cut.

At the same time, the niche sector of insect-based proteins is advancing fast and striving to develop insect-based products that are affordable, healthy and safe. Finally, cultured meat is being produced from animal stem cells using tissue engineering techniques. This field is still at the prototype stage and research is primarily driven by universities — often benefiting from public funding and venture capital investment.

Nevertheless, the field of alternative proteins is the source of much debate. There are huge uncertainties about consumer acceptance, nutritional value, product safety, public health implications, animal welfare, environmental and climate impacts, and economic feasibility.

6. Knowledge is power: ensuring traceability and informing consumers

When it comes to food, consumers care about nutritional information, production methods and environmental impacts. Beyond that, however, they also care about product origins and their ethical credentials, ingredient traceability, and information on shelf life and potential spoilage. Consumers need standardised and trustworthy information to make informed and sustainable choices and reduce food waste. This, combined with technological advances, is currently driving the rapid development of a variety of mandatory and voluntary food packaging labels — including nutritional labelling, eco-labelling, smart labelling and technological traceability solutions, such as blockchain. For instance, researchers at Imperial College London have developed a prototype of low-cost, smartphone-linked and eco-friendly spoilage sensors for meat and fish packaging.

However, without proper integration, multiple labelling schemes running at the same time could
confuse consumers — creating lack of trust, uncertainty and unnecessary costs for businesses. From a circular economy perspective, using smart sensors in food packaging gives rise to questions about resource consumption, recycling and waste generation. Other critical uncertainties relate to who will take the lead in defining what ‘sustainability’ means for the different food products — and ensuring that the information that consumers receive is reliable.

7. Reclaiming retail: (re)connecting farmers with consumers and businesses

Various practices are emerging to enhance producer, business and consumer relations — often resulting in local and shorter food value chains. They include farmers’ markets, community stores, food hubs and online platforms where local producers can be competitive. These practices offer direct contact and build trust between producers and consumers and are driven by an increased demand for local and seasonal food, and rapid digitisation. For example, the project Baltic Sea Food united partners from 10 countries across the Baltic Sea region to develop a sustainable business model. Its goal was to enable optimised, short, business-to-business (B2B) distribution chains in the local food sector and increase the value of local products.

Producer-to-consumer trade creates economic opportunities for small and mid-sized farms and businesses, increases self-sufficiency within the local food system and generates opportunities for circular practices. It also increases consumer access to local, seasonal and fresh food, and the potential for local tourism. However, uncertainties exist in relation to the environmental impact of the farming methods employed, the implications for wider food system resilience and more.

8. Procurement strategies supporting sustainable agricultural and fishing practices

Sustainable food procurement activities could support local, sustainable farming and fishing practices; incentivise industries to develop products, services and technologies with lower environmental and social impacts; and encourage sustainable and healthy diets and behavioural changes. For example, the city of Salo in Finland serves 14,000 meals in schools, hospitals and other public facilities every day. These are procured using environmental and social sustainability criteria to promote animal health and welfare, food safety and social responsibility.

Two main novel aspects of sustainable procurement strategies are emerging. First, these strategies are increasingly becoming part of wider, comprehensive policies promoting circular production and consumption. Second, green and sustainable procurement is often used as a tool to realise...
interrelated social, economic, environmental and health benefits. Despite the progress made towards ‘greening’ public procurement, tensions remain between trade and competition principles and environmental, social and health goals.

Both labelling and public procurement are two key types of policies that can really make a difference both on the demand side and on the supply side. Public procurement policies are really in their infancy and the EU can be a key enabler promoting them.

Franco Sassi, Professor of International Health Policy and Economics, Imperial College London

9. Menu for change: restaurants feed appetite for sustainability

Over the last decade, a range of restaurants across Europe have been sites for experimenting with sustainability practices. Some of these initiatives attempt to bring deeper changes to the current food system, whether through community engagement or sustainability education. In Spain, Azurmendi offers sustainable haute cuisine in a bioclimatic and LEED-certified building, meaning that it meets globally recognised sustainability criteria. Known for its renewable energy systems that offset the building’s carbon footprint, the restaurant has also distinguished itself as a sustainability leader with its proactive role in encouraging knowledge sharing and a circular economy.

Driven by consumers and chefs with growing environmental awareness, restaurants are increasingly adopting plant-based menus, incorporating upcycled food products, inventing new dishes to avoid food waste, sourcing local and seasonal produce, supporting sustainable food production, adopting measures to reduce water and energy consumption, using green cleaning products and growing their own food. However, ‘greenwashing’ is widespread: many restaurants mislead diners by using expressions like ‘locally sourced’, ‘artisanal’ or ‘organic’ in their menus when not appropriate.

10. The gift that keeps on giving: upcycled foods and food into energy

Many companies and start-ups, social enterprises and EU research projects are tapping into the potential of using food waste. A wide range of innovative concepts and products are emerging — with food waste innovation set to be a high-growth area over the next few years. New initiatives focus on
upcycling food waste to create new foods or functional ingredients, for example.

Another area of interest is developing methods to turn food waste into viable and economic energy sources. For instance, ReFood is a British food waste recycler that uses anaerobic digestion to produce biomethane for the United Kingdom’s National Grid. In a month-long process, bacteria convert the blended organic matter into methane.

Ultimately, upcycled food products can offer important nutritional value, contribute to consumer awareness of food waste, generate additional revenue and create jobs. However, there are uncertainties in terms of feasibility at the industrial scale, food waste stream availability, business incentives and consumer acceptance.

The time for food system transformation is now

One thing is clear: we need widespread, systemic change to shift the food system towards sustainability (EEA, 2021a; EU, 2022).

In recent months, severe drought — fuelled by a lack of precipitation and by heatwaves — has affected different regions in Europe, reducing crop yield and crop yield potential (Toreti et al., 2022). Across the globe, unprecedented droughts are exposing millions of people to food insecurity (FAO, 2022; JRC, 2022). In its latest report, the Intergovernmental Panel on Climate Change (IPCC) warned with high confidence that ‘climate change will increasingly put pressure on food production and access, especially in vulnerable regions, undermining food security and nutrition’, and that the severity of impacts is expected to increase alongside global warming (IPCC, 2022).

The diversity of emerging social innovations identified through horizon scanning (and other work) proves that some of this necessary change is already under way. Now, change can and must be accelerated. The EEA’s horizon-scanning project shows that a variety of actors are engaged in social innovation across the entire food chain. Businesses, entrepreneurs, researchers, governments, public institutions and civil society groups are forming new alliances and experimenting with different ways of producing, trading and consuming food. What motivates them to act? A perceived social need, an economic or business opportunity, an ethical call or a combination of all three. Underpinning these actions is growing recognition of the flaws and dysfunctionalities of the current food system — and an awareness of the mounting climate, environmental, social and challenges.

The emerging issues identified in this briefing illustrate different types of social innovations that respond to specific challenges in the food system — and open up opportunities for change and job creation. These innovations combine new and existing social practices, partnerships and business models — and are often enabled by new technologies. The interconnections between them reveal an interdependent ‘ecosystem of innovations’ comprising multiple objectives, strategies and visions for
sustainability.

The emerging issues identified also highlight that collaborative networks are fundamental to the way that social innovations emerge and develop. Moreover, governments (and public policies) play an instrumental role in facilitating and promoting networking and accelerating collective learning; they are also crucial for providing political support and recognition, funding and resources to, for example, facilitate experimentation, and for offering training opportunities.

From a policy perspective, enabling systemic change requires a broad range of policies to promote innovation and experimentation, enable the spread of new ideas and approaches, and ensure that structural economic change leads to fair outcomes for all (Figure 2). The 10 emerging issues identified illustrate the types of innovations that have the potential to transform the food system and move towards sustainability. Now, it is crucial to encourage the spread of these types of innovations as we phase out unsustainable modes of producing, trading and consuming food.

![Figure 2. Policy mixes supporting systemic change towards sustainability](image)

Source: Adapted from Loorbach et al. (2017).

Although the work that informed this briefing provides valuable insights into emerging social innovations that offer potential to transform the food system and move towards sustainability, further
research is needed. When it comes to social innovations for the food system, we need to better understand:

- their risks and opportunities, and the interconnections between them
- the potential for new, emerging forms of governance and partnerships to be replicated, upscaled and adopted by the mainstream
- the types of indicators and evaluation frameworks that could be used to monitor and assess the impacts of social innovations across multiple dimensions.

The EEA will continue to work towards gaining a better understanding of the social dimensions of innovation, how innovation connects to sustainability transitions, the relevant implications for policy and governance, and the knowledge system needed to move forward.

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Notes

[1] The strategy sets concrete targets to transform the EU’s food system, including a reduction by 50% in the use of and risks posed by pesticides, a reduction by at least 20% in the use of fertilisers, a reduction by 50% in sales of antimicrobials used for farmed animals and aquaculture, and the proportion of agricultural land used for organic farming reaching 25%.

[2] Restricting the search to materials published in English has most likely excluded a number of local initiatives documented in other languages and/or sources.

[3] Waste streams are often defined as flows of a specific type of waste, from source through to recovery, recycling or disposal.
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