Sustainability in the food supply chain

Annotation

The food cycle – from its production, to consumption, to waste processing – has an impact on nature, food safety and our health. The current food production chain in Europe is not sustainable in the long term because the environment suffers. Sustainable food production is a complex issue and means a change in attitudes and measures in the field of agriculture, food and related industries, legislation and consumer behaviour.

Food chain, food system

Food chain

The basis of food law is Regulation (EC) No. **Regulation (EC) No 178/2002 of 28 January** 2002 **laying down the general principles and requirements of food law, establishing the European Food Safety Authority and laying down procedures in matters of food safety.**

'It is necessary to take measures to ensure that unsafe food is not placed on the market and that systems are in place to identify and address food safety problems, in order to ensure the proper functioning of the internal market and to protect human health. Similar issues should be addressed in the area of feed safety. It is therefore appropriate to include in food law requirements for feed, in particular for its production and use, where such feed is intended for food-producing animals, without prejudice to similar requirements which are currently in use and which will be applied in the future in feed legislation, applicable to all animals, including pets.'

In order to ensure food safety, it is necessary to take into account all aspects of the food production chain as a whole, from primary production and feed production to the sale or supply of food to the consumer, as each link can have a potential impact on food safety.

Almost all commodities move through the following stages of the food chain in various forms and quantities:

1. **Primary production = primary production**

animal husbandry or crop cultivation, including harvesting, milking, and keeping food-producing animals before slaughter. It also includes animal hunting, fishing, and wild fruit picking. It is also necessary to take into account the production of animals that can be used as feed (e.g. for fish) and other agricultural inputs at the level of primary production, which may have a direct or indirect impact on food safety.

2. **Stages of production, processing and distribution of food and meals (industrially produced)**

any stage, including importation, from primary production of foodstuffs to storage, transport, sale or delivery to the final consumer, including, where appropriate, the import, production, manufacture, storage, transport, distribution, sale and supply of feedingstuffs.

3. **Consumer**

A final consumer is a consumer of a food who does not use a food in the course of the operation of a food business or its activities.

To ensure a comprehensive approach to the food chain, a Standing Committee on the Food Chain and Animal Health has been set up to assist the European Commission in implementing food safety measures at different levels of the food chain.

Food system

The food system encompasses all processes related to food production and use, including environmental impacts. The food system includes food production and supply chains, food environments, consumer behaviour, diet and health, as well as the social, economic and environmental impacts of each of these factors.

Today's food systems account for almost one-third of greenhouse gas emissions and consume significant amounts of natural resources.

How to start sustainable production?

And achieve a production method that uses processes and systems that do not pollute the environment, conserve non-renewable energy and natural resources, are economically efficient, are safe for workers, communities and consumers, and do not compromise the needs of future generations?

European food is already a global model of food that is safe, sufficient, nutritious and of high quality. This is due to the EU's long-standing policies to protect human, animal and plant health, and the efforts of farmers, fishermen and aquaculture producers. European food should now also become a global standard for sustainability.

EU agriculture is the only major system in the world that has reduced greenhouse gas emissions (by 20% since 1994). However, even within the EU, this progress is neither linear nor homogeneous across all Member States. The production, processing, retailing, packaging and transport of food is also a major contributor to air, soil and water pollution and greenhouse gas emissions, and also has a serious impact on biodiversity. Therefore, while the EU's transition to sustainable food systems has already started in many areas, food systems remain one of the main causes of climate change and environmental degradation. There is an urgent need to reduce dependence on pesticides and antimicrobials, reduce over-fertilisation, expand organic farming, improve animal welfare and reverse biodiversity loss.

Putting food systems on a sustainable path also brings new opportunities for actors in the food value chain. New technologies and scientific discoveries, combined with increasing public awareness and demand for sustainable food, will benefit all stakeholders.

This will also mean changes in eating habits, as well as opportunities for the development of new food products (e.g. alternative protein products), the improvement of dietary advice and the development of innovative practices to reduce loss and waste.

The European Commission, with its **Farm to Fork Strategy**, wants to set up such a system, i.e. a system that ensures both food safety and nature protection.

The strategy covers a wide range of aspects related to diet. It ranges from reducing the amount of pesticides used, through new rules for livestock farming, minimising food waste and truthful labelling to sustainable and environmentally friendly agriculture and the overall greening of EU agricultural policy. The strategy will complement existing EU legislation and create a comprehensive framework covering the entire chain of food production, supply and consumption.

EU strategy for fair, healthy and environmentally-friendly food systems

The Importance of Food Production

The EU's food system ensures fresh and safe food for all Europeans. Food production is not only a vital service, but also a source of income. The EU's agri-food chain provides food security for more than 400 million citizens and is one of the EU's major economic sectors. However, it has a significant impact on the environment. The current food model also has a negative impact on people's health, leading to more than 50% of adults in Europe being overweight.

That is why the EU is working to change the way food is produced and consumed in Europe.

In order to:

- reduce the environmental footprint of food systems
- strengthen the resilience of food systems to crises
- continue to ensure that future generations have access to healthy and affordable food

The COVID-19 pandemic has shown how important it is to have a robust and resilient food system that works in all circumstances and is able to ensure that citizens have access to a sufficient supply of affordable food. This pandemic has also made us acutely aware of the links between health, ecosystems, supply chains, consumption habits and planetary constraints.

Farm to fork (F2F) strategy or from farm to fork

The F2F strategy is the basis of the EU's agricultural policy, which aims to make food systems fair, healthy and environmentally friendly.

F2F is part of the so-called "Freedom of Movement". **European Green** Deal (= Green Deal, EGD). The aim of the EGD and the F2F strategy is to create a new system in which nature, food systems and biodiversity are in greater balance, protecting the health and well-being of citizens while increasing competitiveness and resilience. The EGD is an umbrella document for individual initiatives and strategies, e.g.:

- European Climate Law
- **Strategie Farm to Fork**
- EU Biodiversity Strategy
- Circular Economy Action Plan
- Organic Action Plan
- EU Chemicals Strategy
- EU methane strategy
- Zero Pollution Action Plan
- Carbon Border Adjustment Mechanism

Not all plans, sub-strategies and initiatives are yet binding.

F2F is at the heart of the Green Deal, as the transition to a sustainable food system can bring environmental, health and social benefits.

1. Structure F2F

it consists of a main message and an annex/addendum, which together essentially form an F2F strategy action plan.

2. Objectives of F2F:

- Ensure that food production, transport, distribution, trading and consumption have either a neutral or positive environmental impact;
- Conserve and restore natural resources on land and at sea
- Mitigate climate change
- Turning biodiversity loss into growth
- Ensure food security, nutrition and public health

3. Key points of the F2F Strategy

a) F2F & organic (organic farming)

- Achieve a target of at least 25% of organic land in the EU's total farmland by 2030 and a significant increase in organic aquaculture.
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- Identify the best methods to establish minimum mandatory criteria for sustainable public procurement of food supply in order to promote healthy and sustainable diets, including organic food in schools and public institutions.
- Take measures to facilitate the registration of seeds of varieties, including seeds for organic farming, and to ensure better market availability of traditional and regional varieties.
- Propose an action plan for organic farming.
- Revise the European programme for the promotion of agricultural and food products.

b) F2F & CAP (Common Agricultural Policy)

- Funding new "eco-schemes" to support sustainable practices such as precision agriculture, agroecology (including organic farming), carbon sequestration and agroforestry. These "eco-schemes" must be part of the strategic plans of the member states.
- For the recommended specific objectives of the CAP, Member States will set their own national values to achieve these objectives.
- Member States' strategic plans must reflect agricultural practices that can reduce the use of pesticides in the CAP and should provide access to advice.

c) F2F & Pesticides & Fertilizers

- Measures to reduce the risks and use of synthetic pesticides in general, by 50% by 2030 and the use of more dangerous pesticides by 50% by 2030.
- Revision of the Directive on the sustainable use of pesticides, facilitating market entry for plant protection products containing biologically active substances.
- Strengthening integrated pest management measures and promoting the use of safe alternative ways of protecting crops from pests and diseases.
- Revision of relevant measures and legislation related to the reduction of nutrient losses by at least 50% so as not to deteriorate soil fertility at the same time. This change will reduce fertiliser use by at least 20% by 2030.

d) F2F & Sustainable Food Systems

- By the end of 2023, the Commission will propose a legislative initiative for a sustainable food system framework. The Commission will consider the formulation of common definitions and principles of general food sustainability that will guide future policy and legislative developments.
- The Commission will also explore options to align the different voluntary environmental declarations and develop a sustainability labelling framework that covers the nutritional, climate, environmental and social aspects of food, in synergy with other relevant initiatives.

e) F2F & New Innovative Technologies

- Promoting new innovative technologies, including biotechnology and the development of bio-based products that are safe for consumers and the environment and benefit society as a whole, e.g. studies on the potential of genomic techniques to improve sustainability throughout the food chain.

f) F2F & competition

- Establishing competition rules for collective initiatives to promote sustainability in food supply chains, thereby supporting farmers and fishermen to achieve a better position in supply chains.

- Implement the Unfair Commercial Practices Directive in individual Member States.
- Improving agricultural regulations that strengthen the position of farmers (e.g. GI producers), their cooperatives, collectives and organisations in the supply chain.

g) Other significant elements of F2F

Climate

Europe's new low-carbon initiative under the Climate Agreement includes, for example, certification of carbon removal from the atmosphere. This is based on transparent "carbon accounting", i.e. the monitoring and verification of actual carbon removal.

Food animals

- reducing total sales of antimicrobials for farmed animals and aquaculture in the EU by 50% by 2030
- revision of legislation on animal welfare, including the transport and slaughter of animals, consideration of the possibility of indicating the quality of animal welfare on product labels;
- the introduction and market entry of sustainable and innovative feed additives.

Grocery store

- Contingency plan for food security and food security
- reviewing legislation on food contact materials to improve food safety and public health, promoting new and sustainable forms of packaging using recyclable and reusable materials;
- changes in the composition of processed foods, including setting maximum levels for certain nutrients;
- tackling food fraud, European Anti-Fraud Office (OLAF)
- targeted use of tax incentives, for example to promote organic fruit and vegetables
- the European Code of Conduct on Responsible Business and Business Practices and the monitoring framework for these factors.
- halving food waste at retail and consumer levels by 2030

Consumers

- setting nutrient profiles to limit the promotion (through nutrition or health claims) of foods high in fat, sugars and salt;
- a proposal for a harmonised front-of-pack nutrition declaration requirement to give consumers a choice in their food choices based on healthy diets;
- Replacing single-use packaging and cutlery with reusable products.

4. Tools to achieve goals

- Legislative
- Action plans and measures
- Financial mechanisms
- Research and innovation
- consultancy services
- Agricultural Knowledge and Innovation System (AKIS)
- Tailor-made solutions for small and medium-sized enterprises

5. Problematic external factors

The environmental ambitions of the European Green Deal will not be met if Europe acts alone. The factors influencing climate change and biodiversity loss are global and are not confined to

national borders. The EU can use its influence, expertise and financial resources to encourage its neighbours and partners to join it on this sustainable path.

6. Problematic internal factors

- The competitiveness of European industry has been declining for a long time as a result of over-regulation, unrealistic environmental objectives and high energy prices. In addition, the EU has long lagged behind the US, China, Japan and Korea in the global trend of digitalisation, which is key for the future.
- Insufficient allocation of funds in relation to a comprehensive long-term strategy.
- About 80% of the document is focused unilaterally on the processes of reducing CO2 emissions and achieving carbon neutrality, including in the case of addressing the issues of agriculture, sustainable mobility and others.
- proposals to revise existing EU legal standards in a situation where previous ones have not yet been fully implemented.
- Technologies are presented as solutions, the massive commercial application of which will then clearly lead to a further increase in energy prices.
- This strategic document, which aims to fundamentally change the economic life of the entire EU for decades to come, lacks the necessary feasibility studies and impact assessments of the implementation of the entire strategic plan, e.g. the loss of jobs in industry.

Principles of ensuring sustainable food production

WHAT HAPPENS WHEN YOU ASK PEOPLE...
"IS IT IMPORTANT FOR YOU TO ENSURE SUSTAINABLE FOOD PRODUCTION?"
FEW PEOPLE would ANSWER NO to this question **!**

WHAT HAPPENS WHEN YOU ASK PEOPLE...
"DO YOU KNOW WHAT FOOD SUSTAINABILITY MEANS? AND WHAT DOES IT TAKE TO SECURE IT?"
FEW PEOPLE would KNOW the ANSWER to this question **!**

The first definition of SUSTAINABLE DEVELOPMENT is contained in a UN report prepared in 1987. The first transnational study on the need to implement a sustainable food supply was published more than 10 years ago!

To make the food supply chain sustainable, all actors need to be involved. Farmers, fishermen and aquaculture producers need to change their production methods faster and make the best use of natural, technological, digital and space-based solutions to achieve better climate and environmental outcomes, increase resilience to climate change, and reduce and optimise the use of certain inputs (e.g. pesticides and fertilisers). These solutions require human and financial investment, but also promise higher returns by adding value and reducing costs.

Sustainability of livestock production

Throughout the European Green Deal, livestock production is the most mentioned sector by the European Commission, within which it is necessary to strengthen climate- and nature-friendly practices and the transition to sustainability. The livestock sector is mentioned in all the major strategies and action plans presented by the European Commission so far – from *the Farm to Fork* Strategy, the Biodiversity *Strategy, the EU Beating Cancer* Plan, the Action Plan on Organic Farming, *the EU Methane Strategy* and the *EU Zero Pollution* Action Plan. The ambitious nature of the targets and the number of planned initiatives are in line with the European Commission's efforts to strengthen the sustainability of the sector.

Climate goals

The European Green Deal aims to achieve climate neutrality by 2050, while the *European Climate Law* aims to reduce greenhouse gas emissions by 55% by 2030. To meet this target, the European Commission has also focused on livestock emissions, in particular methane and ammonia, in a number of complementary strategies.

According to the Commission, the following should be monitored and managed:

- Good herd management practices, which should include the selection of breeds to be adapted to local conditions; animal health management practices to preserve animal health, reduce the need for veterinary treatment and minimise morbidity and mortality in populations; and practices to optimise herd management to mitigate methane emissions from enteric fermentation and optimise resource efficiency by increasing productivity, including optimising age at culling, extending the lifespan of animals by improving animal health, optimising fertility rates, where high fertility rates contribute to the reduction of greenhouse gas emissions.
- Good livestock feeding practices that reduce greenhouse gas emissions through the modification of compound feed; dietary practices that reduce methane emissions from enteric fermentation of ruminants; and sustainable feed procurement. According to the Commission, feed additives and optimised feeding concepts, as well as breeding programmes focused on health, longevity and fertility, can significantly reduce methane emissions from intestinal fermentation at low cost.
- The Commission will continue to develop good manure management practices, in particular for anaerobic digestion; treatment of slurry and manure in agricultural equipment; suitable processing and storage systems for slurry or digestate; procedures for the appropriate handling and storage of solid manure to reduce emissions and nutrient leakage; application techniques to reduce ammonia emissions when slurry and solid manure are applied to agricultural land; and nutrient management practices that significantly reduce nutrient loss and fertilizer use.
- Manure management and the use of anaerobic digestion of animal excrement can cost-effectively reduce methane production from animal husbandry. In the context of the circular economy, the Commission highlights the possibilities of biorefineries producing biofertilisers, protein feed and bioenergy. According to the Commission, farmers should seize opportunities to reduce methane emissions from livestock by starting renewable energy production and investing in anaerobic reactors to produce biogas from agricultural waste and residues such as manure.

The issue of methane and ammonia is addressed by the Commission in particular in:

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- *The EU Methane Strategy* (it does not yet mention binding targets for methane reduction, nor proposals to reduce the size of herds in intensive agricultural production or to change the diets of EU citizens)
- in *the Circular Economy Action Plan*
- in the Taxonomy for Agriculture *proposals (This is a package of measures that the Commission says will help improve the flow of money towards sustainable activities in the EU.)*
- in the *FitFor package55* (The package is a set of proposals to revise climate, energy and transport legislation and to introduce new legislative initiatives to align EU legislation with the EU's climate objectives.)
- in *the EU Zero Pollution Action Plan*

Antibiotics

TARGET: 50% REDUCTION

Antimicrobial resistance (AMR), associated with the excessive and disproportionate use of antimicrobials in veterinary and human medicine, leads to an estimated 33,000 deaths and high healthcare costs in the EU/EEA each year. The Commission will therefore take action to reduce sales of antimicrobials for livestock and aquaculture across the EU by 50% by 2030. The new regulations on veterinary medicinal products and medicated feed set out a wide range of measures to help achieve this objective and promote the 'One Health' approach.

Animal welfare

The European Commission has prepared a wide-ranging **revision of current** legislation on animal welfare.

The revision covers the following issues:

- cage farming
- transport of live animals,
- animal slaughter (stunning);
- and animal welfare labelling on food packaging.

Organic farming

The European Commission is quite progressive in its approach to organic farming. The main general objectives for organic farming have already been published in the *Farm to Fork* Strategy and the *Biodiversity Strategy*. This approach will contribute to achieving the objective of using at least 25% of the EU's agricultural land for organic farming by 2030 and to significantly expand organic aquaculture.

Organic farming has a positive impact on biodiversity, creates jobs and attracts young farmers. In addition to measures such as eco-schemes (the new eco-schemes will offer a large amount of funding to promote sustainable practices such as precision farming, agroecology, low-carbon agriculture and agroforestry), investment and advisory services, and Common Fisheries Policy measures, the Commission presented *an Action Plan on Organic Farming*. This will help Member States to stimulate both the supply and demand for organic products. Through promotional campaigns and green public procurement, it will ensure consumer confidence and increase demand.

In order to improve the availability and price of sustainable food and to promote healthy and sustainable diets in institutional catering, the Commission will identify the best way to **set minimum mandatory criteria for public procurement of sustainable food**. This will help cities, regions and public authorities fulfil their role by purchasing sustainable food for schools, hospitals and public institutions, as well as supporting sustainable farming systems such as organic farming. The Commission will lead by example and strengthen sustainability standards in the catering contract for its canteens. It will also review the EU School Scheme to further encourage the consumption of sustainable food and, in particular, to raise awareness of the importance of healthy diets, sustainable food production and reducing food waste.

Tax incentives should also support the transition towards a sustainable food system and encourage consumers to choose sustainable and healthy diets. The Commission's proposal on VAT rates (currently under discussion in the Council) could allow Member States to use rates in a more targeted manner, for example to promote organically grown fruit and vegetables. EU tax systems should also seek to ensure that the price of different foods reflects their true costs in terms of the use of scarce natural resources, pollution, greenhouse gas emissions and other external environmental impacts.

Related objectives and initiatives of the European Green Deal related to pesticides (defined in particular in the *Action Plan for Organic Farming*):

— The Commission will focus on animal nutrition rules to bring them into line with organic rules. Alternative sources of organic vitamins, especially vitamin B, will be investigated; Non-GMO feed additives will be supported

— In addition to increasing the availability of feed protein from regional sources, alternative protein sources for feed production should be found to ensure sustainable and diversified animal nutrition. These could include insects, marine feed (e.g. algae) and by-products of the bioeconomy (e.g. waste from fisheries and aquaculture). In addition, organic animal feeding standards should be updated

— Organic animal husbandry must meet the EU's high animal welfare standards and meet the species-specific behavioural needs of animals, in line with the EU's approach to disease prevention

— Support research and innovation on alternative nutrient sources, farming and animal welfare in aquaculture; promote investment in adapted polycultures and multitrophic aquaculture systems; and to promote hatcheries and nurseries for embryos and young from organic farming

Tagging

The European Commission plans to revise the current food labelling rules and extend them to other types of labelling in order to strengthen the information provided to consumers:

- Animal Welfare Labeling
- Labelling informing consumers about the environmental impacts of meat and meat products production
- Country of origin marking
- ecological score (Eco-Score, Planet-Score

Promotion

The rules for agri-food commodity promotion programmes are being reviewed to:

- strengthen their contribution to sustainable production and consumption, to a shift to a diet containing more plant-based foods and less red and processed meat and other foods associated with cancer risks
- Restrictions on marketing of unhealthy food products to children, including online marketing
- strengthening support for organic farming and sustainably produced food under the School Milk and School Fruit Scheme
- strengthening support for organic farming and sustainably produced food in public procurement and catering in schools, hospitals and government offices

Alternative proteins

The alternative protein sector is growing rapidly, and the European Commission supports research into plant-based alternatives to animal products, as well as research into lab-grown meat and fermentation.

However, food companies are investing and planning to invest much more money in the development of the production of alternative proteins.

Sustainability of crop production

The European Commission emphasizes crop production less than livestock production, but still sets a number of very ambitious goals for crop production. Key objectives are defined in the *Farm to Fork Strategy* and the Biodiversity Strategy*, but many others are also represented by other strategies and action plans, including* the Action Plan for Organic Farming, the Zero Pollution Action Plan *and the* EU's Beating Cancer Plan.

Plant protection products

According to the Commission, the aim of future EU legislation is not to completely eliminate pesticides, but rather to minimise their impact on human health and the environment by reducing dependence on pesticides and through the use of alternative methods and low-risk non-synthetic pesticides. Main objectives:

- 50% reduction in the use of chemical pesticides by 2030
- 50% reduction in risks associated with the use of chemical pesticides by 2030
- 50% reduction in the use of high-risk pesticides by 2030

Fertilizers

The European Commission has included among the main objectives of the European Green Deal the reduction of the volume of fertilizers used, linking the issue of fertilizer production with the issue of carbon dioxide leakage into the air. The Commission will support the objective of zero nitrogen and phosphorus pollution from fertilisers through a target to reduce nutrient losses by at least 50%. This target will also lead to a 20% reduction in fertiliser use by 2030.

Organic farming

The main objective of the European Green Deal related to organic farming is to increase the area of organic farming to 25% of the EU's agricultural land area by 2030. This includes supporting the demand for organic production (including changes in public procurement to encourage the consumption of organic produce, including fruit and vegetables, in school canteens, public catering facilities, institutions), strengthening the budget for promotion programmes to support organic production, earmarking funding under Horizon Europe to support the conservation and use of genetic resources, pre-breeding and breeding activities and the availability of organic seeds; and will contribute to the development of organic heterogeneous plant reproductive material and plant varieties suitable for organic production.

Exclusion of land from production

Exclusion of land from production was one of the most discussed and problematic topics in the CAP reform negotiations. The main objectives of the European Green Deal related to organic farming:

- At least 10% of the utilised agricultural area must be designated for landscapes with high diversity, such as buffer strips, rotating or non-rotating fallow lands, or landscape features (hedgerows, non-productive trees, terraces, ponds, etc.)
- In general, a larger area will have to be protected – at least 30% of the total land area and 30% of the sea area (currently 26% of land and 11% of the sea are protected)
- Primary forests and old-growth forests must be defined, mapped, monitored and strictly protected, and carbon-rich ecosystems including permanent grasslands, wetlands, peatlands and meadows must also be protected

Biofuels

Biofuels are mainly addressed in the *FitFor package55*, which includes a proposal for a revision of the Renewable Energy Directive. Biofuels also fall under the Sustainable Finance Regulation, the so-called *Taxonomy*.

It is moving away from first-generation biofuels (biofuels from agricultural crops). Second-generation biofuels, also known as advanced biofuels, are fuels that are produced from various types of non-food biomass. Biomass in this context refers to plant materials and animal waste used mainly as a fuel source.

The term second-generation biofuels is used loosely to refer to both "advanced" technologies used to process feedstocks into biofuels and the use of non-food crops, biomass and waste feedstocks in "standard" biofuel processing technologies, where appropriate. This causes considerable confusion. Therefore, it is important to distinguish between second-generation feedstocks and second-generation biofuel processing technologies.

Promotion

The European Commission also plans to support the promotion of products that the Commission assesses to be more sustainable, while limiting the promotion of food that is considered harmful, both from an environmental and health point of view. The Commission aims to reduce support for alcohol, including wine, while the consumption of fruit and vegetables, especially in organic quality, should be encouraged, as well as the reformulation of food and the restriction of marketing for foods that will be assessed as unhealthy.

The Commission is also considering possible adjustments to the tax system so that Member States can promote sustainable and healthy production through different VAT rates, excise and other forms of taxation, while disadvantaging food that is assessed as unhealthy or unsustainable. The Commission will therefore also review EU legislation on the taxation of alcohol, including wine.

Principles of ensuring sustainable food production

Processors and marketers have a significant influence on most of the key points of the F2F strategy:

- Climate neutrality ⇒ : food transport
- Food composition
- Food packaging and labeling
- Promotion of ⇒ consumer decision-making
- Waste
- Responsible business

Elements of sustainable food production

Sustainable food systems

Europe's food systems remain one of the main causes of climate change and environmental degradation, according to the European Commission's Farm to Fork programme. By 2030, all links in the supply chain should therefore contribute to ensuring that the food supply chain has a neutral or positive impact on the environment, so that the European Commission's main goal of achieving climate neutrality by 2050 can be met.

Alternative fuels infrastructure

The Commission has put forward a proposal to revise the existing legislation to accelerate the deployment **of infrastructure for recharging vehicles or refuelling them with alternative fuels** and to ensure an alternative energy supply for ships in ports and stationary aircraft. The proposal covers all modes of transport and includes targets for infrastructure deployment. It also addresses interoperability and improves user-friendliness.

Marketing

In its strategies and action plans, the European Commission also focuses on marketing, aiming – in line with the Commission's general efforts – to strengthen the promotion of sustainable production. The Commission takes a two-pronged approach to marketing – promoting the strengthening of marketing for organic products and food, healthy food and sustainable food; On the other hand, it plans to significantly reduce the marketing of foods that are evaluated as unsustainable or unhealthy. However, there is still no definition of which foods will be considered "sustainable".

Plastics and packaging

In order to reduce the volume of plastic waste, the European Commission is also intensively focusing on plastics, plastic packaging and packaging materials used in the food industry. The Circular Economy Action Plan is the main document that sets out the way forward in this area, but the issue of plastics and packaging is intertwined across a number of other strategies and documents.

The main objectives defined for plastics and packaging and packaging materials in the Circular Economy Action Plan are:

- the introduction of mandatory requirements for the proportion of recycled plastic content as well as mandatory measures to reduce packaging waste
- ensuring that all packaging materials are recyclable or reusable by 2030.

However, it is also necessary to be able to assess when the use of biological feedstock has real environmental benefits that go beyond the lower use of fossil resources.

This is also related to the directive on single-use plastic products and the issue of microplastics. The Commission will revise the legislation on FCMs to improve food safety and public health (in particular by reducing the use of hazardous chemicals), promote the use of innovative and sustainable packaging solutions using environmentally friendly, reusable and recyclable materials, and contribute to reducing food waste.

In the EU Chemicals Strategy, the Commission states that flagship initiatives will include phasing out the most harmful substances in the manufacture of consumer products, including food additives and food contact materials, including endocrine disruptors, substances that disrupt the immune and respiratory systems, and persistent substances such as per- and polyfluorinated alkyl substances (PFAS).

Alternative proteins

The alternative protein sector is growing rapidly, with a dynamic increase in the supply of plant-based alternatives for milk and dairy products and meat and meat products, but more technologically demanding alternatives, including lab-grown meat, 3D meat printers, and insect and seaweed processing, are also developing very progressively. At present, companies are already focusing, for example, on laboratory-grown milk and dairy products, laboratory-grown beef, poultry meat, pork, laboratory-grown seafood, as well as laboratory-grown fats and gelatin.

Tagging

The Commission will introduce a harmonised mandatory front-of-pack nutrition labelling system at EU level. The Commission notes that, according to studies, colour-coding systems, in particular colour-coding in combination with a graduated indicator (such as the NutriScore labelling type), are the most helpful to consumers. The introduction of labelling can encourage producers to reformulate products (food reformulation).

Food waste and food losses

The European Commission's main target for reducing food waste and food loss is to halve per capita food waste at retailer and consumer level by 2030.

Sustainable food consumption

Current food consumption patterns are unsustainable from both a health and environmental perspective. Average intakes of energy, red meat, sugars, salt and fats in the EU continue to exceed recommended levels, while consumption of whole grains, fruit and vegetables, legumes and nuts is insufficient. The most important thing will be to reverse the rise in overweight and obesity across the EU by 2030. By shifting to a diet containing more plants and less red and processed meat and more fruits and vegetables, not only will the risks of life-threatening diseases be reduced, but also the environmental impact of the food system. It is estimated that in 2017 there were more than 950,000 deaths (i.e. one in five) and the loss of more than 16 million healthy years in the EU due to unhealthy diets, mainly due to cardiovascular diseases. Clear information needs to be provided to make it easier for consumers to make healthy and sustainable dietary choices, improve their health and quality of life, and reduce healthcare costs.

Tool and objectives of awareness-raising and information campaigns

- Creating a healthy eating environment that encourages consumers to choose healthy, sustainable food
- Food labelling will enable consumers to choose healthy, sustainable eating habits
- Stepping up the fight against food waste
- Sustainable food labelling framework

At the local level, retail chains influence the behaviour and eating habits of consumers (reduction of food waste, interest in organic products or products of local suppliers).

Sustainable Eating

Definition of Sustainable Diet:

- diets with low environmental impacts, contributing to food and nutrition security and the healthy lives of present and future generations.

Sustainable diets protect and respect biodiversity and ecosystems, are culturally acceptable, accessible, economically fair and affordable; nutritionally adequate, safe and healthy; in the optimization of natural and human resources. Most sustainable diets involve reducing consumption of meat, dairy, and eggs due to the broad-based environmental impact of these industries.

Diets labeled "sustainable"

- low-carbon diets that are structured to reduce the impact of global warming.
- Focus on regionalized diets, e.g. Mediterranean diet, Nordic diet (emphasizing the consumption of local food)

"Less, but better"

The phrase "less but better" refers to reducing the total amount of meat while increasing the overall quality of the meat consumed. Quality, in this case, refers to a sustainable and responsible way of raising livestock. This means eating less meat, which tastes better and is raised more sustainably. Another similar phrase "less but more varied" refers to less meat proteins consumed while also encompassing more diverse forms of protein, such as plant-based proteins. This can be in the form of a single meal that does not contain meat, or on a "meat-free" day when meat is absent from the day's meal. Both of these sentences have been shown to influence consumer choice.

Consumer

Food manufacturers are particularly responsive to consumer demands. People of the younger generation are increasingly interested in environmental, health, social and ethical issues. They are aware of the strong link between health, quality of life and food. The consumer wants food that is fresh, safe, quick to prepare, functional (containing health-promoting ingredients), sustainably sourced, as well as various alternatives to conventional foods (milk X drinks made from almonds, oats, poppy seeds...).

Longer-term trends include a slightly increasing aggregate consumption of cereals, fruits and vegetables (especially fresh, local and exotic varieties), milk and dairy products, and a decrease in the consumption of sugar and confectionery and alcoholic beverages. There is an obvious increase in demand for food produced in the system of organic or integrated production, with which the interest of producers and sellers in these foods as well as in local products is growing.

There is also a significant group of consumers who avoid gluten and lactose, for example. Vegetarianism (incl. veganism, consumption of raw products, etc.) is becoming an important dietary stream, which brings an increasing interest in foods of plant origin, e.g. plant-based drinks, meat substitutes, purely vegetable meals, etc. It is too early to assess some trends, such as insect consumption, although the use of insect proteins is increasingly being used. There is a growing interest in the production of proteins also from non-traditional raw materials of plant origin.

Food has become a way of life – more and more of us are switching to gluten-free and meat-free diets and regular seasonal "detoxes", and we dedicate ourselves to it full-time, adapting our choice of holidays, friends and life partner accordingly. Food is a source of experience – we eat more and more in restaurants and are willing to pay significantly more money for food than previous generations. And food is a way of self-expression. For many people, being vegan is an expression of protest against meat processing plants and the destruction of the environment, while others define themselves against the entire establishment and social conventions.

Common Alternative Diets

Veganism is a philosophy and lifestyle, an attitude of rejection of the use of animals for human benefit as raw materials or units of production. On a practical level, veganism manifests itself mainly in the exclusion of animal food from the diet, or by not using any animal products (e.g. skin, wool, feathers), non-abuse of animals (refusal to test on animals, animal circuses). Among the reasons that lead to veganism, environmental or ethical ones are most often cited. Vegans do not eat meat, lard, seafood, eggs, dairy, honey, and other animal products. When vegan, care should be taken to get enough vitamin B12, vitamin D, iodine, selenium, calcium and omega-3 fatty acids. An unbalanced vegan diet does not contain sufficient amounts of some important substances, the lack of which can affect the overall performance of the body, brain and mental state. Artificial forms of supplements are often not identical to natural ones, and the effect of their absorption by the human body is not sufficiently scientifically studied. Therefore, there is an opinion among the scientific community that it is good for the human body to receive all nutrients in a natural form.

Raw = **Raw** food – similar to veganism, but they only consume uncooked food. The methods of preparation are also related to the fact that it is really not just a raw food, but an enzymatically living diet. RAW food does not completely avoid cooking.

According to this concept, crops can be cooked up to a maximum temperature of 42°C to 45°C. It has been verified that at this temperature, the food retains its original content of all nutrients, but it does not destroy pathogens.

Vegetarianismis a way of eating (diets) when it is excluded from the dietmeat(red meat,poultry,Seafood, fish and meat from otherAnimals). It may also include the exclusion of other products from theAnimal slaughtersuch as internal organs, skin, and skin derivatives. People embrace vegetarianism for a variety of reasons. Many people do not eat meat for ethical reasons, out of respect for animals, to eliminate their pain and stress. These ethical motivations enact different religious beliefs, just as they are established by different defendersAnimal rights. Other motivations for vegetarianism are related to health and to ecological, cultural,Aesthetic, economic, health or personal preferences. There are different types of vegetarian diets, such asovo-vegetarianDiet (includes eggs but not dairy)lacto-vegetariandiet (includes dairy products but not eggs), andovo-lacto vegetariandiet (includes both eggs and dairy products).

Semi-vegetarian(semi-vegetarian, semi-meatless) diets consist mainly of vegetarian meals, but may also include occasional consumption of fish, poultry, or sometimes other types of meat.PescetarianThe diet is described as "fish, yes, but no other meat."

- Economic Vegetarianism

  An economic vegetarian is a person who practices vegetarianism either from a philosophical point of view, they are motivated by a simple lifestyle or just because of necessity. In the developing world, meat can often be a luxury. Economic vegetarians believe that nutrition can be obtained more efficiently and at a lower cost through vegetables, grains, etc., than from meat. They claim that vegetarian diets are rich in vitamins, fiber, and complex carbohydrates, and carry fewer risks (e.g. heart disease, obesity, and bacterial infections) than meat. As a result, they consider meat production to be economically unsuitable.
- Environmental Vegetarianism

  All types of meat, but especially lamb and beef, generate several times more greenhouse gases than fruit or vegetables. Environmental vegetarianism is motivated by the desire to create to avoid this negative impact of meat production on the environment.

Food Nutrition Footprint Calculator

is a web application that calculates the **relative environmental impact from the ingredients used for one serving of the main meal and from its preparation** (e.g. cooking, frying). This impact is expressed in one number = the total value of the nutritional footprint, which ranges from 1 to 5 (from least impact to highest, similar to grades in school). For better clarity, the severity of the impact is also differentiated in color in the app.

The result of the nutritional footprint in the calculator is calculated in two main steps. From the amount of ingredients used in the recipe, the **environmental impacts per portion of the meal are first calculated separately in each of the five categories:** – climate change, acidification of the environment (acidification), excess nutrients in the water (eutrophication), water loss and land use. These impacts are assigned a severity from 1 to 5 according to the normative scaling system for the given category. The overall Nutrition Footprint result is calculated **by averaging these individual severities** and assigning an overall impact from 1 to 5.

To quantify individual environmental impacts, the so-called Life Cycle Assessment (LCA – ingredients are calculated at the cradle-to-store level, and then the method of preparation is added). To combine the environmental impacts into a single overall value, the so-called 'Environmental Impact Assessment'. Nutritional footprints, we approach in order to **be able to compare different foods based on a single value** (which is dimensionless because it combines environmental impacts with different units).

Research and innovation for sustainable food production

F2F says:

Research and innovation have a crucial role to play in accelerating the transition towards sustainable, healthy and inclusive food systems from primary production to consumption. Research and innovation can help develop and test solutions, overcome obstacles and uncover new market opportunities.

Funding for research and innovation

Horizon Europe is the EU's framework programme for research and innovation for the period 2021-2027. The programme builds on the achievements of Horizon 2020.

Horizon Europe has three main objectives:

- strengthening the European Research Area (ERA) and, by extension, the European research and technology bases
- revitalising Europe's innovation capacity, competitiveness and labour market
- focusing on the priorities of EU citizens and promoting European values.

Horizon Europe is not only the largest, but also (in the words of the European Commission) **the most ambitious research and innovation programme** to date, with the potential to create a significant scientific, societal and economic impact, contribute to climate goals and create new high-skilled jobs.

Under Horizon Europe, the Commission is proposing to spend €10 billion on research and innovation in the areas of food, bioeconomy, natural resources, agriculture, fisheries, aquaculture and the environment, as well as the use of digital technologies and nature-based solutions for the agri-food sector.

A key area of research will cover the microbiome, ocean food, urban food security systems, as well as increasing the availability and abundance of alternative protein sources such as plant, microbial, marine and insect proteins. The action on soil health and food will aim to develop solutions to restore soil health and functions. New knowledge and innovation will also strengthen agro-ecological approaches in primary production through a dedicated partnership for agro-ecological living laboratories. This will help reduce the use of pesticides, fertilisers and antimicrobials.

All farmers and all rural areas must have a fast and reliable internet connection. It is an essential factor for job creation, entrepreneurship and investment in rural areas, as well as for improving the quality of life in areas such as healthcare, entertainment and e-government. Access to high-speed broadband internet will also make it possible to integrate precision farming and the use of artificial intelligence into all policies. It will allow the EU to take full advantage of its world leadership in satellite technology.

The end result will be to reduce costs for farmers, improve land management and water quality, reduce the use of fertilisers, pesticides and greenhouse gas emissions, improve biodiversity and create a healthier environment for farmers and citizens.
Knowledge and advice are key for all actors in the food system to achieve sustainability. Primary producers, in particular, need objective and tailored consulting services to make sustainable management decisions. medium-sized enterprises.
The EU Taxonomy strategy is an implementation tool that enables capital markets to identify and respond to investment opportunities that contribute to environmental policy objectives. Member States will have to increase support for AKIS schemes in their CAP strategic plans, covering all actors in the food supply chain. A Farm Sustainability Data Network will be developed that:

- collect data on the objectives of the Farm to Fork and Biodiversity Strategies and other sustainability indicators
- It will allow benchmarking of farm performance with regional, national or sectoral averages.
- It will provide feedback and advice to farmers through tailored advisory services and link their experiences to the European Innovation Partnership and research projects.
- It will enable the processing and analysis of production, land use, environmental and other data, thereby ensuring an accurate and tailored application of production practices at farm level and monitoring of the sector's performance, as well as support for the Low Carbon Agriculture Initiative.

For example, the Enterprise Europe Network will provide sustainability advisory services to SMEs and promote the dissemination of best practices.

Fight against food fraud

- Food fraud threatens the sustainability of food systems.
- They mislead consumers and prevent them from making informed choices.
- They threaten food safety, fair trade practices, the resilience of food markets and, ultimately, the Single Market.

A zero-tolerance policy with effective deterrents is crucial in this regard.

Circular economy = circular economy

Circular economy

- A mode of production and consumption that adds value to existing products, raw materials and materials through sharing, renting, reusing, repairing, remanufacturing or recycling;
- i.e. to extend the life of products (to eliminate their planned failure rate and obsolescence), to modify and recycle them at the end of their service life and to return the materials thus obtained back to the production cycle (own or otherwise, e.g. within an industrial symbiosis),
- An approach where the loop is closed – preferably at the local level, waste is not ideally generated and is therefore a source for further production.

Linear economy

- *Raw materials are converted into products, sold, and incinerated or landfilled at the end of a relatively short life.*

Circular economy

- **is a solution to the climate crisis** because it creates functional and long-term sustainable relationships between nature and human society;
- **The circular economy aims to make the most efficient use of resources such as plastics, textiles and biomass and to reduce waste;**
- the circular economy is fully in line with the Sustainable Development Goals set by the United Nations for 2030, in particular with Goal 12 Responsible production and consumption;
- It is a current global trend and the demand for products and services that respect the principles of the circular economy will grow
- Companies that are prepared in time and that are able to present their activities and achievements in this field, that produce sustainably and with respect to environmental impacts, will gain a number of benefits. These will include: a reduction in production costs, new business opportunities, high-quality employees and experts, as well as more new customers for whom the origin of the product and its environmental footprint is an important decision-making factor for their purchase.

The principle of the circular economy was proposed by the EU in the *Circular Economy Action Plan, the* proposed measures promote the circular economy at every stage of the value chain – from production to consumption, repair and remanufacturing, waste management and secondary raw materials that are fed back into the economy. The proposed measures have been taken in line with the principles of better regulation and on the basis of appropriate consultation and impact assessments.

Many sectors face specific challenges in the context of the circular economy due to the specific characteristics of their products or value chains, their environmental footprint or their dependence on materials from outside Europe. These sectors require solutions in a targeted way to ensure that the interactions between the different phases of the cycle are fully taken into account throughout the value chain. Therefore, the following have been identified as priority areas:

- plastics (recyclability, biodegradability, hazardous substances in certain plastics and marine pollution);
- food waste (covers the entire food chain);
- critical raw materials (of considerable economic importance for the EU and at the same time vulnerable to supply disruptions);
- construction and demolition waste (one of the largest sources of waste in Europe in terms of volume);
- biomass and bio-based products (e.g. wood, crops or fibres).

The revised legislative framework on waste sets clear targets for waste reduction and launches an ambitious and credible long-term path for waste management and recycling.

The key objectives of the revised proposal on waste include:

- A common EU target to recycle 65% of municipal waste by 2035;
- A common EU target to recycle 70% of packaging waste by 2030

- There are also recycling targets for specific packaging materials:
  - Paper & Cardboard: 85%
  - Ferrous metals: 80%
  - Aluminium: 60%
  - Glass: 75%
  - Plastic: 55%
  - Wood: 30%
- A binding landfill target to reduce landfills to a maximum of 10% of municipal waste by 2035.
- Separate collection obligations will be strengthened and extended to hazardous household waste (by the end of 2022), bio-waste (by the end of 2023), textiles (by the end of 2025).
- Minimum requirements for extended producer responsibility schemes have been introduced to improve their management and cost-effectiveness.

Elements of the circular economy

1. Sustainable product policy framework:
   - principles for designing sustainable products (durability, higher proportion of recyclable parts, reduction of single-use, etc.), mainly for products identified within value chains
   - empowering consumers and public buyers
   - The principle of circularity in production processes
2. Key product value chains (the sustainability challenge of key value chains requires urgent, comprehensive and coordinated action as an integral part of the sustainable product policy framework):
   - electronics and ICT (information and communication technology)
   - Batteries & Vehicles
   - packaging
   - plastics
   - Textile products
   - Construction & Buildings
   - Food, water and nutrients
3. Less waste, more value
   - Supporting waste prevention (legislation, incentives, more information, recycling procedures...)
   - strengthening the principle of circularity in a toxic-free environment (chemicals policy and regulations, e.g. REACH,....)

*Note. **Reach is** an abbreviation for the chemical policy of the European Union, which is based on its content - registration, evaluation (evaluation), authorization (authorization) and restriction of chemical substances. Regulation (EC) No 1907/2006 REACH of the European Parliament and of the Council on the Registration, Evaluation, Authorisation and Restriction of Chemicals (REACH) entered into force on 1 June 2007*

   - Creating a well-functioning market for secondary raw materials
   - restrictions on EU waste exports
4. CE operating at the level of regions, cities and individuals

- Positive effects on the number of jobs
- investment in education systems and abominable training, lifelong learning
- Initiatives – European Urban Initiative, Regions Initiative, Green Capital Accord...

Food loss and waste

Food waste is a global problem, and reducing it undoubtedly has huge potential for actually reducing the resources we use to produce food.
The fight against food waste therefore has a wider or threefold impact:
• saves food for human consumption,
• helps farmers, companies and consumers save money, and
• Reduces the environmental impact of food production and consumption.
In connection with the above, it is also possible to distinguish the costs associated with food waste, which are economic on the one hand and environmental on the other. Economic costs include not only those related to the value of the products themselves, but also the associated costs associated with the processing, production, transport and storage of wasted products. These are mainly the costs incurred or causing damage in the early stages of the food supply chain. And then there are the environmental costs, which cover the entire life cycle of food products, and where waste means wasting resources such as land, water, energy and other inputs, and we cannot forget greenhouse gas emissions. Finally, reducing food waste not only brings savings for producers, retailers and consumers, but it is important to recognise that the recovery and redistribution of surplus food that would otherwise be wasted also has an important social dimension.
Reducing food loss and waste is one of the goals of the F2F strategy. Tackling food losses and reducing food waste will bring savings for consumers and operators, and there is an important social dimension to recovering and redistributing surplus food that would otherwise be wasted. It is also consistent with policies on nutrient recovery and secondary raw materials, feed production, food safety, biodiversity, bioeconomy, waste management and renewable energy.

Difference Between Food Loss and Food Waste
According to the basic distinction used by the Food and Agriculture Organization of the United Nations (FAO), **we define food loss** as "a reduction in the quantity or quality of food". **In** this respect, food waste is de facto part of food losses and refers to the discarding or alternative (non-food) use of safe and nutritious food intended for human consumption that takes place throughout the food chain, from primary production to final consumption in households.
Food waste includes any food and inedible parts of food that have been removed from the food chain without being used (including, for example, composting, ploughing or non-harvesting of crops, anaerobic digestion, bioenergy production, cogeneration, incineration or disposal in sewers, landfills or the sea, etc.). Food waste – if we look at it in the context of waste prevention – contains both edible food parts (i.e. avoidable waste) and inedible food parts (i.e. those parts where food waste cannot be avoided).
Food losses are calculated primarily from the production and distribution of food, but they occur at all levels of the food production, supply and customer chain, and thus "farm to fork".

Food waste is the result of purchasing decisions of consumers and retailers and service providers (e.g. delivery services, etc.), which directly affect consumer behaviour.
According to Eurostat statistics, which are based on the methodology of the Fusions research project, around 88 million tonnes of food losses are generated annually in the European Union, which corresponds to about 173 kg per person, with an estimated cost (or financial loss) of EUR 143 billion per year. These costs relate to the entire food distribution chain.
In terms of food waste production, households with more than half of the total share and the food processing industry occupy the first two places.
Part of the waste is due to legislation that is often introduced in an attempt to protect human health. Another part may be related to consumer preferences and habits. Misunderstanding and misuse of date marking (use-by date and best-before date) also leads to food waste. All these different stages and causes need to be analysed and addressed as needed to reduce food waste.

It is thus clear that, in terms of the origin and sources of food waste and food waste, appropriate measures must therefore be taken not only at the consumption stage (i.e. in terms of consumer behaviour), but also on the part of the food industry and distribution.
Of course, the best way to prevent waste is to prevent excessive food waste, but even in the final phase of consumption, there is a huge potential in practice for reducing food waste and saving food waste in our homes.
To do this, however, it is also necessary to identify the sources of losses, which is why we consider it appropriate to recall the main food groups that are wasted and produce food waste in households.
The largest sources of food waste by volume are: • Vegetables (24%) • Fruit (22%) • Cereals (12%) • Meat (11%) • Oilseeds (10%) • Potatoes (7%) • Dairy products (5%) • Sugar beet (4%) • Fish (3%) and • Eggs (2%).
BUT be careful!!!
Depending on the environmental burden of waste throughout the food supply chain, the food commodities are as follows: • Fish (50%) • Vegetables (46%) • Fruit (41%) • Oilseeds (36%) • Eggs (31%) • Meat (23%) • Potatoes (22%) • Cereals (20%) • Dairy products (5%) and • Sugar beet (4%)

Priority order for action to reduce food loss and waste in the EU
PREVENTION: first and foremost to prevent food loss and waste;
REUSE: reuse food for human consumption through redistribution and food banks, or reuse it as animal feed;
RECYCLING: increase the value of by-products and reuse nutrients for other purposes, such as composting;
OTHER USES: incineration followed by energy recovery.
The first three (prevention, donation and feed) are measures that can be implemented before food becomes waste and are the most preferred solutions (from an economic and environmental perspective).

This work was co-funded by the Erasmus+ Programme of the European Union
Innovation of the structure and content of study programs profiling food study fields with a view to digitizing teaching

Táto publikácia bola spolufinancovaná programom Európskej Únie Erasmus+
Inovácia štruktúry a obsahového zamerania študijných programov profilujúcich potravinárske
študijné odbory s ohľadom na digitalizáciu výučby
FOODINOVO | 2020-1-SK01-KA203-078333

Funded by the European Union. Views and opinions expressed are however those of the author(s) only and do not necessarily reflect those of the European Union or the European Education and Culture Executive Agency (EACEA). Neither the European Union nor EACEA can be held responsible for them.

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