Activity 2.2; Harmonizing with European Policies

Project Title	FoodShift Pathways
Project number	2022-1-SE01-KA220-SCH-000089962
Starting Date	September 2022
Duration	36 months

WHO EU OECD FAO

This project has received funding from the European Union Erasmus+ programme under grant agreement No 2022-1-SE01-KA220-SCH-000089962.

FOODSHIFT Pathways

Project Title	FoodShift Pathways
Contract Number	KA220-SCH - Cooperation partnerships in school education
Work Package	WP2 Needs Analysis and Pedagogical Design
Activity	2.2
Document Name	Harmonizing with European Policies
Due Date	[28/02/2023]
Submission Date	[20/03/2023]
Dissemination Level	[**X**] P – Public [ ] CO – Confidential
Lead Beneficiary	SUSMETRO EU BV
Contributors	KAROLINSKA INSTITUTET, ELLINOGERMANIKI AGOGI SCHOLI PANAGEA SAVVA AE, Carsten Meedom, INSTITUT D'ARQUITECTURA AVANCADA DE CATALUNYA, CIENCIA VIVA-AGENCIA NACIONAL PARA A CULTURA CIENTIFICA E TECNOLOGICA
Author(s)	Dirk Wascher & Merel Dubbeldam (SUSMETRO)
Point of Contact	Dirk Wascher
Reviewers	Ioannis Ioakeimidis (KI) & Sofia Spolander (KI)
Status	Final
Keywords	Policy, sustainability, institutions, governance, impact, food policy

Table of Contents

Executive Summary

The Erasmus+ project **FoodShift Pathways**, Work Package 2 on 'State of the Art & Pedagogical Design' is meant to address – next to the expected Sustainability Competence levels of teachers – also the relevant policy frameworks in support of a transition towards a more sustainable food system. Next to the EU policies mentioned in the project proposal such as the Milan Urban Food Policy Pact and the EU's Farm to Fork Strategy, we also included other policy initiatives at the global level such as those by WHO, FAO and OECD. The inclusion appeared as relevant, because European Member States as well as the institutions of the European Union are following the guiding character of these policies and strategies.

The report starts with a brief review on the European policy development highlighting the role of policy as one element of the *DPSIR framework*, followed by a focus on the *emerging food policies*. As part of a new 10-year programme aiming to accelerate the EU transition to a climate-neutral, resource-efficient clean and circular economy in a just and inclusive way by 2050, the Farm to Fork Strategy (2020) at the heart of the European Green Deal (2019) is aiming to make food systems more fair, healthy and environmentally-friendly. The strategy sets out both regulatory and non-regulatory initiatives, with the common agricultural and fisheries policies as key tools to support a just transition.

Based on a review of 10 European and four non-European policy initiatives between 2011 and 2023, we identified nine prominent issues considered relevant in the context of a transition towards a sustainable food system, namely (1) food waste, (2) food security, (3) innovation, (4) system approach, (5) environment/climate change, (6) system approach, (7) health, (8) production, (9) circular economy and (8) education. By cross referencing these nine issues against the total of the 14 policies we arrived at *clusters of significance* which provided the basis for a set of six key *takeaway messages* and two obvious policy gaps, namely food security and education.

Finally, we identified *four learning methods*, namely exploration, critical thinking, practice and collaboration with respect to the nine policy issues as input to forming pedagogical design principles.

The report is complemented by four annex contributions on key references to food policy development and analysis.

1. Introduction

Within the Erasmus+ project **Foodshift Pathways**, Work Package 2 on 'State of the Art & Pedagogical Design', has as goal to perform a teacher training needs analysis to better understand the type of skills and knowledge base of teachers at middle schools (age group 11 – 16) for addressing the topic of sustainable and healthy food in class or during extra-curricular sessions such as field trips and site visits. This needs analysis is meant to address – next to the expected Sustainability Competence levels of teachers – also the relevant policy frameworks in support of a transition towards a more sustainable food system.

2.1 Work Package Objectives

The results of the needs analysis will feed directly into the 'pedagogical design' addressing deeper and interdisciplinary learning as the ultimate goals of this work package. The description of WP2 specifies:

- *Perform a needs analysis on the basis of a user-driven incubation process with the key stakeholders;*
- *Start from the premise that schools can facilitate deeper learning in environmental education (emphasis on rigorous core content and the development of competences needed for university and career*
- *Introduce interdisciplinary learning and adopt an approach based on Sustainability Competences as an effective step towards creating more meaningful episodes of learning that focus heavily on skills.*
- *Interweave technology and critical thinking with climate change as an effective way of putting the acquired knowledge directly in use within a meaningful context*
- *Guide the project's Pedagogical Design to help students imagine new ideas in the field of SFS; to shift from "what is" to "what might be".*

While the policy dimension is not explicitly mentioned in this set of objectives, the proposal itself makes very clear that the development of sustainability-oriented curricula and related teaching themes should be routed in a wider societal view on education. Therefore, policy references are important to acknowledge.

2.2 Approach

Since this project builds upon the EU Horizon project FoodSHIFT 2030 and because the authors are closely involved in the European policy processes revolving around healthy and sustainable food, our research could to a fair amount draw upon existing knowledge. Next to the EU policies mentioned in the project proposal such as the Milan Urban Food Policy Pact and the EU's Farm to Fork Strategy, we also included other policy initiatives at the global level such as those by WHO, FAO and OECD. The inclusion appeared as relevant, because European Member States as well as the institutions of the European Union are following the guiding character of these policies and strategies.

In the following section, we present a brief review on the European policy development highlighting the role of policy as one element of the DPSIR framework, followed by a focus on the emerging food

policies. The latter shows that each policy takes a different angle on the topic of sustainable Food Systems, e.g., by addressing different priorities and core issues with special attention to the role of sectors and stakeholders . In order to make sure that the pedagogical design is based on a set of widely acknowledge core issues, we undertook a cross-comparison aimed to highlight the most frequently mentioned issues.

Finally, we provide some views on the 'take-away' messages from these findings as input to the pedagogical design.

2. A brief review of European Sustainability Policy

This section will provide a brief review of those – mainly EU – food-related policies which are fostering a transition towards a sustainable food system. By doing so, the project aims at making reference to these policies as drivers of change and will summarise European trends and uncertainties. In this way, any effort in improving the education of European young people is meant to be well founded in the most recent and relevant policies. While this does not necessarily mean that school curricula addressing sustainable food systems should include learning materials about European policies – as such aspects are unlikely to belong to the core of young children's knowledge base -, principle information on food policies must be considered important for those who are developing curricula in the field of sustainability and of course also for teachers who seek a better understanding of which topics, positions and trends are based on a common and official European approach and is supported by legislation and policy communications, which in turn are backed by the Member States of the European Union.

In this sense, 'harmonisation with European policies' means primarily, that the project objectives – namely offering tools and insights *that are suitable for overcoming the food crisis by supporting teachers and schools in their efforts to educate future generations to think creatively, solution-oriented and innovatively* – should follow those widely accepted principles and knowledge domains that have led to concrete sets of measures as reflected in recent European policies.

The most powerful and financially largest – arguably also the most impactful – legislative instrument of the European Union has always been the Common Agricultural Policy (CAP) which must be considered one of the key drivers of both agriculture and food. Related to CAP, but receiving less attention, is the Common Fisheries Policy (CFP) which regulated the market for fisheries products and access to fishing waters. Other than the forest decline in the late 80ties triggered by acid rain attributed to industrial air emissions, other environmental impacts such as loss of biodiversity, soil degradation, ground water pollution and the disappearance of traditional landscapes have been closely linked to CAP as one of the drivers in boosting industrial forms of agricultural.

According to Article 191(2) of Treaty on the Functioning of the European Union (TFEU) there are four main environmental principles that must guide policy within the scope of EU law:

EU policy on the environment shall aim at a high level of protection taking into account the diversity of situations in the various regions of the EU. It shall be based on the ***(1) precautionary principle*** *and*

*other the principles that **(2) preventive action** should be taken, that **(3) environmental damage should as priority be rectified as source** and that **(4) the polluter should pay**.*

Especially the fourth principle points at the significance of the cause-effect relationship – hence the question who or what can be held accountable for environmental impacts. As the above example of CAP illustrates, these relationships are not always clear. In order to illustrate the rather complex relationships of environmental changes, the European Environmental Agency (EEA) made frequent use of the Driving Force – Pressure – State – Impact – Response framework, in short DPSIR (see Figure 1)

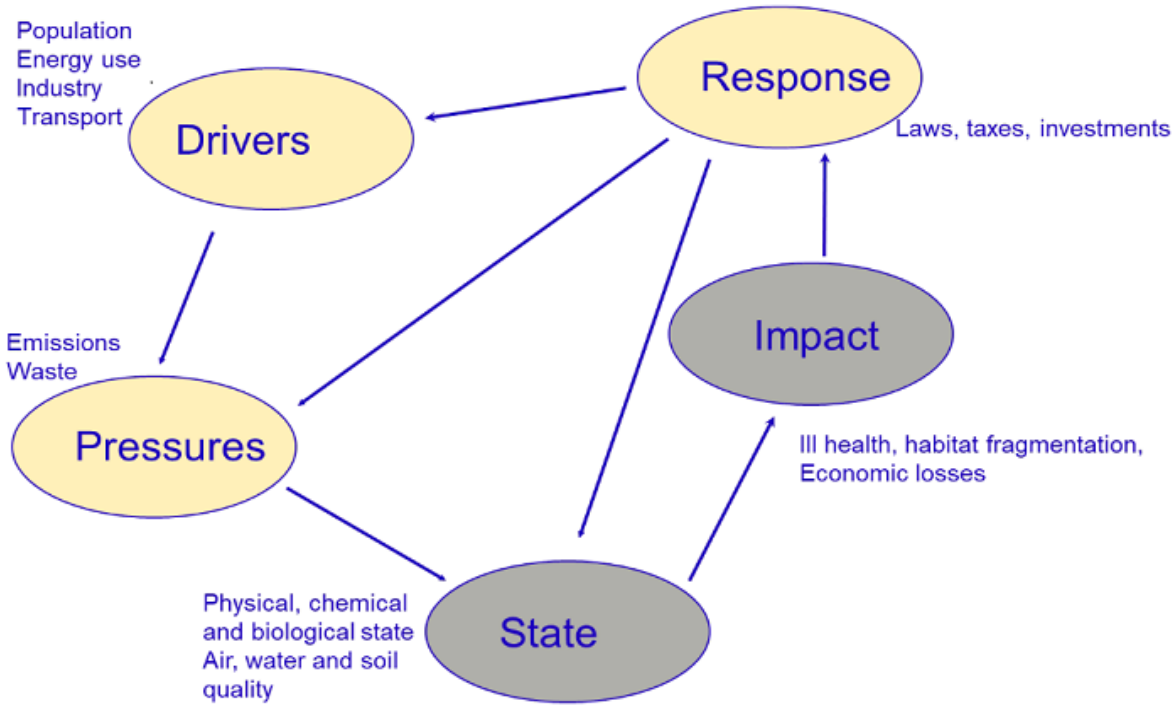


Figure 1. DPSIR framework illustrating environmental and policy relationships.

As it can be seen in this framework, policies are considered as 'response' mechanisms addressing societal and environmental needs. However, the CAP had demonstrated that also policies could act as drivers – certainly if they interfere with or change national and international trade and price regimes.

In order to commit to the principle of damage prevention, the EU introduced the broader instrument of a Sustainability Impact Assessment as a legal-methodological requirement under the Commission's better regulation agenda, which seeks to design and evaluate EU policies and laws so that they achieve their objectives in the most efficient and effective way.

In 1972, the European Union launched a series of Environmental Action Plans that resulted in legislative instruments such as NATURA 2000 covering the Bird Directive (79/409/EEC) and Habitat Directive (92/43/EEC) as well as the Nitrate Directive (91/676/EEC) or the European Soil Framework Directive (2006-2014). Another very recent example for European policy action addressing environmental and health issues is the controversial plant protection substance Glyphosate, which is

considered to affect biodiversity (insect life, bee populations) and human health as well. Despite widely supported public and NGO efforts to stop its application, the Commission adopted an Implementing Regulation on 2 December 2022, extending the approval of glyphosate until 15 December 2023.

On 2 May 2022, the 8th Environment Action Programme entered into force, as the EU's legally agreed common agenda for environment policy until 2030. The new 10-year programme keeps the 2050 vision and enforces it by aiming to accelerate the EU transition to a **climate-neutral, resource-efficient clean and circular economy in a just and inclusive way**, fully endorsing the environmental and climate objectives of the European Green Deal. The 8th EAP should also provide a basis for the achievement of the environmental objectives of the UN Agenda 2030 and its 17 SDGs. Most notably, SDG 4 addressing the wider role of education, specifies under Target 4.7 'Education for Sustainable Development and Global Citizenship':

> *By 2030, ensure that all learners acquire the knowledge and skills needed to promote sustainable development, including, among others, through education for sustainable development and sustainable lifestyles, human rights, gender equality, promotion of a culture of peace and non-violence, global citizenship and appreciation of cultural diversity and of culture's contribution to sustainable development*

The 8th EAP calls for active engagement of all stakeholders at all levels of governance, to ensure that EU climate and environment laws are effectively implemented. It forms the EU's basis for achieving the United Nation's **2030 Agenda** and its **Sustainable Development Goals**.

3. The emergence of European Food Policy

'Food' and 'health' are two broad subject areas that are often mentioned in the same context, since many health concerns are linked to nutrition and diets. This is also manifested in the establishment of the European Commission's Directorate for Health and Food Safety (DG SANTE) supporting the efforts of EU countries to protect and improve the health of their citizens and to ensure the accessibility, effectiveness and resilience of their health systems.

3.1 Health policies

While 'public health' had been first addressed in the Treaty of Maastricht (1992) – a milestone in the formation of the European Union – it took ten years before the launching of the European Food Safety Agency (EFSA, 2002) and the first EU Public Health Programme (2003-2008) to take shape. Since then, the EU has put forward a series of health related policies addressing issues such as patients' rights in cross-border healthcare, regulation of clinical trials, standards for medical devices, digital health & care, as well as various regulations around tobacco. In *response* to the COVID-19 crises the Commission established a new dedicated European Health Emergency Preparedness and

Response Authority (HERA) in September 2021. Because of the cross-sectoral nature of public health issues, the EU developed the Health in All Policies (HIAP) approach, integrating health aspects in all relevant policies (Articles 9 and 168(1) of the TFEU; Article 35 of the Charter).

3.2 Food Safety policies

Though food safety has been a matter of policy attention as early as 1992, it became increasingly evident that – given nowadays knowledge and concept of the *food system* – its focus has been too narrow by only addressing:

- Food hygiene: food businesses, from farms to restaurants,
- Animal health: sanitary controls, measures for pets, farmed animals & wildlife monitor
- Plant health: detection and eradication of pests, ensure healthy seeds.

Just as 'health', 'food' must be considered a rather 'horizontal topic' reaching into a wide range of science and policy themes such as agriculture, transport, energy, health and the environment to name just the most important. 'Food' is non-sectoral because it encompasses a wide range of socio-economic and environmental components, illustrated by the principle of the *food chain*: food production (land, soil, farming, nature) – food transport and processing (machinery, energy, packaging, etc) – food marketing and consumption (pricing, distribution, transport). At each step of the food chain, environmental and social domains such as climate, biodiversity, air and water quality, animal welfare and human health are affected. However, addressing the late arrival of 'food' in the policy context only falls short of acknowledging the fact that the complexity of the food system did not receive proper attention in academia and science neither. Even at dedicated research centres such as Wageningen University Research, environmentalists, technology experts and food scientists operated in sometimes centuries old, isolated knowledge domains of their scientific disciplines. It was only with the arrival of the climate crisis and more recently due to the urgency of the COVID-19 pandemic crisis effecting international trade and food chains – hence 'food security', that non-sectoral themes such as 'food' moved up the European policy agenda.

3.3 Key international food policies

It hence does and cannot surprise, that teaching 'sustainable food systems' poses quite a challenge for many schools and teachers – also because the inclusion of 'education' is still lacking behind in many initiatives. Nevertheless, facing the observed urgencies, recent developments in both research and policy have led to something that has the potential of a paradigm shift. From the perspective of 'food', the Farm to Fork Strategy (2020) at the heart of the **European Green Deal** (2019) is aiming to make food systems more fair, healthy and environmentally friendly. The strategy sets out both regulatory and non-regulatory initiatives, with the common agricultural and fisheries policies as key tools to support a just transition.

The next steps are also in view, namely a **proposal for a legislative framework for sustainable food systems** to be put forward to support implementation of the strategy and development of sustainable food policy. Taking stock of learning from the COVID-19 pandemic, the Commission also intends develop a **contingency plan for ensuring food supply and food security**. And at the global

scale. EU will **support the global transition** to sustainable agri-food systems through its trade policies and international cooperation instruments.

Though EU policies are of primary interest in such a review, it should be noted that other international legal frameworks and policy initiatives are of relevance as well. The lighthouse function of the UN's Sustainability Development Goals but also strategic communications put forward by FAO and OECD are cases in point. Another driver – some might argue leading drivers – of the food policy development in Europe is the Milano Urban Food Policy Pact which sees mayors of cities as key players in the transition of food systems. Though most of these non-European policy initiatives are not legally binding, current policy development would not be the same without them as they offer space for new forms of governance and the empowerment of cities towards regional or national governments.

Table 1. Checklist of issues1 addressed in key international food policies (please see in light blue EU policies,

		Food waste	Food Security	Innovation	Environment Climate change	System approach	Health	Production	Circular Economy	Education
2011	Roadmap to a Resource Efficient Europe (COM (2011) 571 final)	✓✓✓		✓✓✓						
2014	"Towards a circular economy: A zero waste programme for Europe" (COM 2014/0398).	✓✓✓							✓✓✓	
2015	The Milan Urban Food Policy Pact (MUFPP)	✓✓✓	✓✓	✓	✓	✓✓✓	✓✓✓	✓✓✓	✓	✓✓
2015	Sustainable Development Goals (UN 2030 Agenda for SD)	✓✓✓	✓✓✓ (SDG 2)	✓✓✓ (SDG 9)	✓✓✓ (SDG 13)		✓✓✓ (SDG 3)	✓✓✓ (SDG 12)		✓✓✓ (SDG 4)
2015	Action Plan "Closing the loop" (European Commission)	✓✓✓								
2015	European Committee of the Regions with its "Resolution on Sustainable Food",	✓								
2016	EP Resolution "Resource efficiency: reducing food waste, improving food safety"	✓✓✓								
2016	Food losses and food waste" Council of the European Union, Conclusion 10730/16	✓✓✓								
2017	Harnessing Research and Innovation for FOOD 2030: A science policy dialogue (European Commission conference proceedings)			✓✓✓	✓✓	✓✓	✓✓			✓
2020	EC Farm to Fork Strategy	✓✓✓		✓✓	✓✓✓	✓✓✓	✓✓✓	✓✓✓	✓	*
2020	Innovators' handbook (FAO and INRAE)	✓	✓	✓✓✓	✓	✓	✓	✓✓	✓✓	✓✓
2021	Making Better Policies for Food Systems (OECD)		✓✓✓		✓✓		✓✓✓	✓✓✓		
2023	European Law for Sustainable Food Systems (EC, to be launched)	*	*	*	*	*	*	*	*	*

[1] The significance of issues addressed in these policies has been assessed the following way: empty box = no explicit mentioning; ✓ = the issue is frequently mentioned, ✓✓ = there are clear policy-related statements addressing the issue; ✓✓✓ = the issue is a headline topic in the respective policy (dedicated chapter/section); * programmed for future launch

Table 1 compares a set of topics/goals that can be found in such key international policy initiatives. The comparison makes clear, that 'education' has yet been a central concern of most, with the Farm to Fork Strategy and MUFPP being the exception. In the following, the policy initiatives will be briefly summarized. Given that most of them are quite comprehensive in terms of length and topical range, these summaries can only highlight a few characteristics.

4. Key takeaways

Table 1 shows that the year 2015 has been a rather decisive moment for sustainability and food policy development – it is the year when the UN brought forward the Sustainability Development Goals which have become guiding principles for research and policy development all over the world; it has been the launching year of the MUFPP – basically an act of governance innovation putting cities on the map of the transition process and it was the year when the European Union came up with its first resolution on sustainable food. It took, however, another five years until the European Commission – facing increasing evidence of climate change in form of severe impacts such as floods, extreme weather events and unprecedented heat waves – approved the Farm to Fork Strategy as part of the Green Deal under Ursula van der Leyen. While previous policy initiatives had been revolving largely around the need to reduce (food) waste, and to boost circular economy, the Farm to Fork Strategy clearly takes a 'system approach', addressing the food system as a whole (hence its title) and makes clear references to the role of innovation and sustainable production as key targets. In the following, we will briefly address prominent issues as well as some of the obvious gaps regarding the goal of this project.

4.1 Teaching themes for prominent policy issues

- Food waste: this can be considered a leading topic as it strongly represented in virtually all policies – also because it forms the basis of any approach related to circular economy. There are actually rather solid facts and figures regarding food waste in most countries as well as at the European level (Ecologic 2020). The topic lends itself also quite well for teaching as food waste occurs in families and in school cafeterias. There is hence ample opportunity to demonstrate the impact of sustainable management with direct impact on the pupils environment.
- Innovation: emphasis on innovation is something that the F2F strategy shares with both the EC's conference report 'Harnessing Research and Innovation for Food2030: A Science-Policy Dialogue' and the Innovator's Handbook issues by FAO and INRAE. The latter as well as MUFPP are actually the only documents that point at education as one of the key drivers for transition. Innovation along the food chain is an interesting topic for teaching as it appeals to exploration, inventions, science and experimenting. The world of food system innovation is extremely divers (see Wascher et all 2018) and can make use of many aspects of existing school curricula.
- System approach: This can be considered the most academic and conceptually ambitious demanding approach as it thrives for understanding the complex interrelations between the different components even beyond what is considered the 'food chain'. It essentially means to draw up the connections between different sectors affecting food (e.g., transport, energy,

agriculture, etc) , the often antagonistic role of different stakeholders engaged in the food system (producers and consumers just being the most obvious ones) and role of the economy and policy. The DPSIR framework (see figure 1) provides here some insights. Teaching aspects of food systems at the level of middle schools puts most probably quite some demands on the abstraction and demonstration skills of a teacher and should be carefully reviewed.

- Health: just like 'food waste', health is a rather concrete and widely acknowledged issue. Healthy food is a matter that can be expected to be addressed in many families, it written and documented in many newspapers and films. At the same time, it is also quite controversial as it potentially interferes with the sense of personal freedom of what and how much to eat. There are many examples that conflicts between parents and school management (vegetarian school food – yes or no), but also at the political level which can lead to 'lock-ins' and problems. However, the target group of this project is very likely to be adequate and most likely also responsive.
- Production: these are essentially the farmers producing the food. Due to many issues around environmental degradation and animal welfare, farmers find themselves in a rather difficult societal situation ('blamed for all what is going wrong') and are actually in the spotlight of political conflicts. At the same time, farmers enjoy wide support as carrying tacit knowledge regarding land and methods, carry out 'hard and honest work' and are essential for our life as they produce the food we daily eat. Information on farmers and visits to farms provide great opportunities for teaching sustainable production – provided the teacher knows how to properly prepare the children for such a visit or encounter.
- Circular economy: just like 'innovation', this topic offers great communication potentials as narratives can be very illustrative at different scales. It is possible to explain circular economy principles on the basis of the daily school food routines, by visiting a farm or even an innovative company producing insects for fish feed on the basis of agricultural or household waste streams.

4.2 Observed policy gaps

- Food security: this issue is not that frequently mentioned, and if so more by non-European policy initiatives such as FAO, OECD and MUFPP. The very likely reason is that food security is not considered to be (that) much of a concern as Europe prides itself with having one of the densest and world-wide efficient food supply networks in place. However, recent crisis situations such as the pandemic event COVID-19, the Russian-Ukrainian war, but also the effects of Brexit on the UK supply chains have demonstrated that food security is far from being only a non-European issue. In fact, it can be assumed that the (almost) omission of food security in European policy documents is very likely to be related to the agricultural/food industry lobby. More specifically, it is the role of regional food supply as put forward by NGOs, cities and research as offering more food security than the dependency on global trade and long-distance transport. The latter is not only of high energy impacts, but also frequently impacting on animal welfare.

- Education: it is obvious that this issue is largely under-represented in most policy documents. Fortunately it does appear in the key documents MUFFP, Farm to Fork Strategy (with the prospect of a dedicated policy initiative announced for Q4/2023: *Revision of the EU school scheme to refocus it on healthy and sustainable food*) and conference proceedings from '*Harnessing Research and Innovation for Food2030: A Science-Policy Dialogue'. The latter suggests "to Integration of different forms of knowledge (i.e., evidence-based, experimental,*

embodied experience), underpinned by different values (i.e., socio-environmental justice, economic competitiveness etc.) must be strengthened in R&I for food systems".

We did not include the JRC document 'GreenComp' in this review as it provides mainly an expert framework on Sustainability Competences and is covered in the respective FoodShift Pathway Activity 2.2.

5. Recommendations for Pedagogical Design Principles

This sections intends to translate the findings from the above food policy review to a set of 'design principles' when addressing pedagogical challenges and opportunities regarding sustainable food system transition. Addressing the policy dimension, these recommendations can only be partial as future lecture material is meant to address a certain societal consensus reflected in the European food policy process, without providing clear-cut building blocks for such a pedagogical design. We also would like to highlight here at the intersection with the Sustainability Competences (SC, described in Activity 2.3, addressing *knowledge, skills and attitude* as important pedagogical qualifications.

A quick comparison immediately reveals the topical juxtapositions between the two concepts policy issues and SC. Following Wiek and Keeler (2011), SC is closely related to interpersonal competences, namely the *ability to motivate, enable, explore and facilitate collaborative and participatory sustainability research and problem solving*. As such, interpersonal competences link with all other SC, there is need to rely on collaborative approaches in order create ownership, to build joint capacity to cope with complex sustainability challenges.

Based in the above contextual insights regarding the link between pedagogical design and interpersonal competences when teaching sustainability issues, Table 1 compares the key food policy issues in relation to the adequateness of learning experiences:

- **Exploration**: experimenting, discovery, new insights, visiting science museum and/or using of serious gaming tools.
- **Critical Thinking**: the analysis of available facts, evidence, observations, and arguments to form a judgment[2]
- **Collaboration:** requires interaction between partners supporting each other in solving problems or carrying out tasks – stressing inter-dependency between people and resources.
- **Practice:** This methods requires practical training and skills related to work, craftmanship and/or training to reach satisfying results.

In the following sections, we will briefly discuss the above learning method in the context of the assumed adequacy for the selected food policy issues. It should be noted that linkages can actually be established between all policy issues and all learning methods. Nevertheless, some methods appear to be more adequate than other.

[2] Glaser, E.M. "Defining Critical Thinking". The International Center for the Assessment of Higher Order Thinking (ICAT, US)/Critical Thinking Community. Retrieved 22 March 2017 (Wikipedia)

Table 2. Policy issues in the light of four pedagogical design elements/learning methods (darker colours indicating strong cross-references, light colour likely cross-references)

Policy issues	Exploration	Critical thinking	Practice	Collaboration
Circular Economy				
Innovation				
System Approach				
Food Security				
Food Waste				
Health				
Production				

5.1 Exploration

Typical food policy issues are innovation, food security and to a certain degree health. Food system innovation plays a role along the full food chain and entails the following dimensions: governance, process, social and product innovation (Wascher et al. 2015). The innovation examples that have been identified in the FoodSHIFT 2030 project show that they are often brought to life by relatively young people and are based on out-of-the-box thinking, inventiveness and experimenting. Therefore, food system innovation appears to be a perfect vehicle for triggering the explorative mind of young people and lets join the expedition into new possibilities in terms of materials, procedures and ways of doing things. Certain innovations (e.g. fermentation processes) can be demonstrated at school, whilst others might need field visits at the locations of innovators or in science centres.
Food security is a topic that can actually be quite challenging. Food security addresses the availability of food – hence also its shortage or non-accessibility (e.g., so-called 'food deserts' in certain regions or cities, where there are no shops or outlets). Food security is also something that relates to global trade and the vulnerability of food supply according to transport problems, military conflicts, oil/energy prices, pandemic events and/or extreme weather events associated with climate change. Though food security can be rather abstract, there are ways of illustrating it by means of serious gaming, e.g., the Metropolitan Foodscape Planner (Arciniegas et al 2022) . With this tool, student can make use of a digital table when (playfully) allocating new land use in order to improve the security of a (their) city region.
Health is another issue that lends itself for exploration since is related to our daily diets and consumption attitude. Especially young people are vulnerable to (fast/sweet) food advertisements and obesity is on the rise throughout Europe where salty and meat-based food is affecting our health. Field trips to supermarkets, exploring the role of food labelling and cooking lessons to try out new healthy ingredients can form interesting lessons.

5.2 Critical thinking

Main domains of critical thinking are circular economy, the food system approach and again health. The main objective of circular economy is resource efficiency in terms of waste avoidance and re-use. Ultimately this means that there should be no waste streams anymore, but only resource/biomass streams which are being used over and over again. Such an approach requires on the one hand collaboration (see next section), but also critical thinking in questioning our current approach which is deeply rooted in linear thinking. This calls for the close cooperation between different food system actors as well as between food system actors and non-food players when re-using energy and making waste streams circular. as one of their prevailing design principles. Making circular economy principles visible or tangible can be quite a challenge. We hence consider 'critical thinking as an

adequate way of understanding the environmental/social impacts of certain product (LCA) or production processes.
The food system approach is quite closely related to circular economy because the latter is very much one of the desirable principles for the future food system. Quoting again from Wiek and Keeler (2011), a system approach is the ability to collectively analyse complex systems across different domains (society, environment, economy, etc.) and across different scales (local to global), thereby considering cascading effects, inertia, feedback loops and other systemic features related to sustainability issues and sustainability problem-solving frameworks. In practice, this means that students can draw up such systemic features and engage in different forms of critical thinking regarding the role of the different actors affecting the food system. This can entail role-play games and visits to science museums.
To a certain degree, health can benefit from applying critical thinking methods as this will help the students to better understand the misleading role of food advertisement and inadequate food environments in relation to health issues

5.3 Practice

The two leading policy issues related to this method are food waste and production, followed by circular economy and innovation.
Food waste can be considered the demonstration item par excellence because of the daily experiences of students in the home environment and at the school cafeteria. Food waste is one of the leading policy issues in many cities and organisations, with plenty of initiatives taking place by NGOs, technologies and geurrilla-style protest actions. Exercises with students can be directly applied at the school and in practical daily life.
Compared to the evidence of food waste, production is often much further away from a student's daily life between MacDonald's, home and school. In fact, many students have never seen a farm or have an idea were butter, Nutella or the fruit they eat comes from, let alone that there is any knowledge about how food is being produced. Therefore, school visits for farmers or food processing plants can be very educative. Practical experiences on such a farm or in a school garden directly on location are probably the most effective ways of teaching food production.
But also circular economy and food innovation can be taught in practical terms, by giving tasks to students to – for example – make use of a 3D-printer for making use of left-over food (e.g. from bread), or growing mushrooms on coffee-grounds collected from households and restaurants. These and many more circular innovation methods can be applied by the target group.

5.4 Collaboration

Examples for this method include circular economy and the system approach – to a certain degree also food waste and production.
Especially for circular economy and the system approach, teaching methods should address the multi-stakeholder approach involving different players not only along the food chain, but also from different sectors. Here collaboration is key for sharing resources and making use of different fields of expertise. The same applies to practicing food waste reduction and cooperating with each other when producing food.

The above examples for applying different teaching/learning methods when addressing food policy issues are just illustrative for the type of engagement that could be considered when developing pedagogical design proposals for sustainable food system teaching.

References

Ecologic 2020. EU Policy Review for Food Waste Prevention and Valoration. Deliverable D3.3 of the EU project REFRESH funded by the Horizon 2020 Framework Programme of the European Union under Grant Agreement no. 641933.

European Commission 2017. "Harnessing Research and Innovation for FOOD 2030: A science policy dialogue". Conference outcome report 16 Oct 2017, Brussels, 60p.

FAO and INRAE. 2020. *Enabling sustainable food systems: Innovators' handbook.* Rome. https://doi.org/10.4060/ca9917en

European Commission 2020. Farm to Fork Strategy. A Farm to Fork Strategy for a fair, healthy and environmentally-friendly food system. Communication from the Commissioni to the European Parliament, The Council, the European Economic and Social Committee and the Committee of the Regions, COM/2020/381 final

CoR 2019. The Green Deal in partnership with local and regional authorities. Resolution VI/038 on Susainable Food. European Committee of the Regions, 10 pages

Council of the European Union. 2016. Food losses and food waste Council conclusions, Proceedings 10730/16, 10 pages

European Commission 2011. Roadmap to a Resource Efficient Europe. Communication from the Commission tot he European Parliament, the Council, the European and Social Committee and the Committee of the Regions. Communication 571 final, 26 pages.

European Commission 2014. Towards a circular economy: a zero waste programme for Europe. Progress Report on the Roadmap to a Resource Efficient Europe. Communication from the Commission tot he European Parliament, the Council, the European and Social Committee and the Committee of the Regions. Cummunication, SWD(2014) 206 final/2, 19 pages;

European Commission 2015. Closing the loop - An EU action plan for the Circular Economy. Communication from the Commission tot he European Parliament, the Council, the European and Social Committee and the Committee of the Regions. COM(2015) 614 final, 26 pages.

European Commission 2017. "Harnessing Research and Innovation for FOOD 2030: A science policy dialogue". Conference outcome report 16 Oct 2017, Brussels, 60p.

European Commission 2020. Farm to Fork Strategy. A Farm to Fork Strategy for a fair, healthy and environmentally-friendly food system.

Communication from the Commissioni to the European Parliament, The Council, the European Economic and Social Committee and the Committee of the Regions, COM/2020/381 final

Euopean Commission 2023. This initiative aims to make the EU food system sustainable and to integrate sustainability into all food-related policies. To be launched.

European Parliament 2016. Draft Report on initiative on resource efficiency: reducing food waste, improving food safety (2016/2223(INI)), 10 pages

Ecologic 2020. EU Policy Review for Food Waste Prevention and Valoration. Deliverable D3.3 of the EU project REFRESH funded by the Horizon 2020 Framework Programme of the European Union under Grant Agreement no. 641933.

FAO and INRAE. 2020. Enabling sustainable food systems: Innovators' handbook. Rome. https://eur01.safelinks.protection.outlook.com/?url=https%3A%2F%2Fdoi.org%2F10.4060%2Fca9917en&data=05%7C01%7Csofia.spolander%40ki.se%7Ceab5ad1d98ec428a300c08db3a65d56c%7Cbff7eef1cf4b4f32be3da1dda043c05d%7C0%7C0%7C638167981267259252%7CUnknown%7CTWFpbGZsb3d8eyJWIjoiMC4wLjAwMDAiLCJQIjoiV2luMzIiLCJBTiI6Ik1haWwiLCJXVCI6Mn0%3D%7C3000%7C%7C%7C&sdata=QTudKJmuqBmk9SwH2HObdLdV2%2FhXovlIATECS43mlVg%3D&reserved=0

Milan Municipality 2015. Milan Urban Food Policy Pact: a global commitment for more sustainable and food secure food systems, https://eur01.safelinks.protection.outlook.com/?url=https%3A%2F%2Fdoi.org%2F10.1787%2Fdddfba4de-en&data=05%7C01%7Csofia.spolander%40ki.se%7Ceab5ad1d98ec428a300c08db3a65d56c%7Cbff7eef1cf4b4f32be3da1dda043c05d%7C0%7C0%7C638167981267259252%7CUnknown%7CTWFpbGZsb3d8eyJWIjoiMC4wLjAwMDAiLCJQIjoiV2luMzIiLCJBTiI6Ik1haWwiLCJXVCI6Mn0%3D%7C3000%7C%7C%7C&sdata=419Aq4eZ62j1WTWzDQNYr%2BQh53jYu4Pwh4CHg%2BulrZ4%3D&reserved=0, 280 pages

OECD 2021. Making Better Policies for Food Systems. 280 pages

UN 2015. Sustainable Develpment Goals. Part of the United Nations Post-2015 Development Agenda.

Annex 1: REFRESH Deliverable 3.3 (Ecologic 2020)

Executive Summary

This report provides an overview of the most relevant existing EU policies and instruments with an impact on food waste generation and/or prevention. It explains the relevance of the different policy areas and discusses potential opportunities for improvement.
The analysis builds on existing literature and research that allows identifying the range of potential impacts on food waste of different policies. Quantitative insights from measurement and evaluation are in most cases not available through existing studies and need further research. However, the policy screening provides an overview of the linkages between policy areas and the (often non-coherent) design of instruments, illustrating the existing potential to further improve the efficiency of EU policies on food waste reduction. The authors therefore conclude the need to politically address food waste in the context of sustainable and healthy food systems as well as into the context of resource efficiency policies.

Building on the analysis of the main policy instruments and potential impacts on food waste in each policy area the authors draw first conclusions about potential entry points for improvement. These are however not specific policy recommendations yet. Rather, the overview of policies lays the foundation for more specific policy recommendations that will be published during late 2018 and early 2019 in four key areas of the REFRESH work: use of surplus food to animal feed, building of voluntary alliances between business and policy actors, behaviour change of consumers and unfair trading practices.
While the report intends to provide an overview of EU policies it is not exhaustive. We focused on those policies that

- were assumed to have the highest impact on food waste generation and opportunities for reduction;
- are of key relevance to the four content areas on which REFRESH puts a particular research focus on (see above)
- particularly recognizes those policy areas that are currently under review and can potentially be influenced through the REFRESH policy work. This is done without duplicating work that is undertaken elsewhere such as in the case of food donation, where guidelines are currently under development.

Policy areas that have been analysed in more detail are the following:

- waste and resource policies,
- food safety and hygiene regulation (including the special case of surplus food use for animal feed),
- agricultural policy (CAP),
- fisheries policy (CFP),
- unfair trading practices (UTPs), and
- bioenergy.

These policy areas are (extensively) regulated within several regulatory frameworks. The report also discusses policy areas that are less regulated, but still provide different entry points for policy makers to address food waste, namely:

- The role of voluntary agreements and how policy makers can support their success.

- Policy approaches to change consumer behaviour, e.g. through on-pack information (including, but not exclusively date labelling) and information and awareness campaigns directed at consumers and businesses.

In summary, the policy screening shows that there is a broad range of relevant EU policies that influence food waste generation, prevention and valorisation. In many cases, such as the hygiene regulation or the EUs Common Agricultural Policy (CAP), influential differences can be found on the Member State level. Examples include the requirements for date labelling, the further use of food batches that were withdrawn due to food safety requirements, or the design of rural development measures within the CAP.
The activities of the European Commission to facilitate exchange of good practices at the EU Platform on Food Losses and Food Waste (FLFW Platform) as well as the development of guidelines1 policy areas therefore provide support for improved national implementation.
However, the broad range of relevant and different policy areas in the scope of this report also shows that EU legislation related to food is very complex and scattered across different policy areas, with a lack of a coherent food or food waste strategy in the EU and its Member States.

This lack of a coherent strategy leads to win-lose trade-offs between different policy objectives (such as bioenergy promotion versus the use of surplus food for animal feed). It also often creates unnecessary barriers to prevention and valorisation (e.g. with regard to some hygiene regulations, cosmetic standards of agricultural products) and missed opportunities to exploit existing policies to their full potential, especially for leveraging action at MS level.
Windows of opportunities exist both to introduce new policy instruments (e.g. in the area of unfair trading practices) as well as to reform existing policies (e.g. in the area of waste regulation or with regard to the use of surplus food for animal feed).
Within the policy areas reviewed in more detail in this report, opportunities for improvement exist in the following areas:

- Waste and resource policy: Adopting a binding target to avoid food waste, setting a clear food waste definition, developing a common methodology for measuring food waste, and strengthening the focus on food waste in national waste prevention programmes (NWPPs) present relevant opportunities for using political action to enhancing food waste prevention and valorisation. Additional potential for improving waste policy towards less generation of food waste lays in fostering the separate collection of food waste as part of bio-waste and making landfilling rules stricter as regards biodegradable waste coupled with a possible introduction of pay-as-you-throw schemes that reward generating less food waste. Considering a dedicated food use hierarchy specifying the waste hierarchy in the Waste Framework Directive (that also applies to food waste) can be a useful step to keep food as long as possible in the human food chain before it becomes waste. Even if not implemented in the Waste Framework Directive the below suggested food use hierarchy should be a guiding principle for EU policy making.

- Hygiene and food safety: The main issue regarding food waste drivers related to the hygiene and food safety legislation has to do with the interpretation and application of the legislation rather than the legislation itself. The application and interpretation of the hygiene legislation can be more coherent. More attention can be given to opportunities to minimize food waste. A good example on how this is dealt with are the EU food donation guidelines, launched in

2017. An improved interpretation and application of hygiene and food security measures to prevent food waste could be streamlined with the simplification of logistical and administrative burdens to allow the maximum uptake of surplus food in animal feed. Such streamlining should start from the new Commission Guidelines for the Use of Former Foodstuffs. The feeding of heat-treated meat-containing surplus food to omnivorous non-ruminant livestock, as is currently done in Japan, could help keep potentially significant volumes unavoidable food waste in the food supply chain. Reduced feed costs and feed crop land use would lead to additional environmental and economic benefits. New legislation would be needed to ensure that this can be done safely. REFRESH is developing technical guidelines and policy recommendations.

- Agriculture and rural development: The EU Common Agricultural Policy (CAP) is the most important policy (area) to address food losses and waste in primary production at farm level. It includes a number of instruments that can be used to reduce food losses and waste in agricultural production and rural development (e.g. storage, farm advisory services, animal welfare measures, risk management etc.). There is room however to improve the CAPs contribution to these efforts through improved use of existing instruments and/or through the next CAP reform. Beyond the CAP the definition of food losses versus food waste matters. So far there is no agreed definition yet on food losses versus food waste on EU level yet and its differentiation, indicators and measurement. The definitions will matter though for the responsibility the agricultural sector will have to reduce food losses and waste.

- Fisheries Policies: The introduction of the Landing Obligation in the Common Fisheries Policy (CFP) is an important and significant step towards improving the food waste impact of fisheries policy. The LO is still phasing in, yet there remains room for improvement through more consistent implementation of the existing policy and exploitation of existing support schemes. This includes improvement of monitoring of (unwanted) catches in fisheries, improving enforcement and controls of the CFP, in the long-term reducing exemptions to the LO and reducing temporarily raised quotas, incentivizing use of discards for non-human consumption when prevention is not (yet) possible (e.g. in the bait and fishmeal industry), and improving the use of existing EMFF funds for investments in discard-reducing technologies and increased capacity to handle landed discards.
- Unfair Trading Practices: The approach to UTPs across the European grocery supply chain has so far been fragmented. The existing mechanisms under the EU Supply Chain Initiative are perceived as insufficient to address the imbalance in bargaining power between suppliers and retailers that drive UTPs. Member State legislation, where it exists, does not yet efficiently address the challenges of complex, international supply chains, including both direct and indirect supply to retail markets. Underlying reasons are a lack of transparency and a lack of awareness of legislation, as well as concerns amongst suppliers about the influence of complaints on existing or future commercial relations. As UTPs fall largely into the remit of competition law, legislation can be developed to addresses the main drivers of UTPs, including lack of transparency and power imbalances that inhibit demand forecasting/information sharing, cosmetic standards, and overly stringent Minimum Life On Receipt requirements. There is potential to improve legislation beyond the current codes of practice on MS level (e.g. Grocery Supply Code of Practice in the UK) given the complexities of the supply chain. Enforcement bodies could be allocated more adequate resourced and given investigative powers and an ability to fine those engaged in UTPs. Addressing UTPs through legislation could also serve to improve the effectiveness of Voluntary Agreements in Member States, which are currently biased in favour of retailers and manufacturers of branded products, with primary producers being underrepresented.

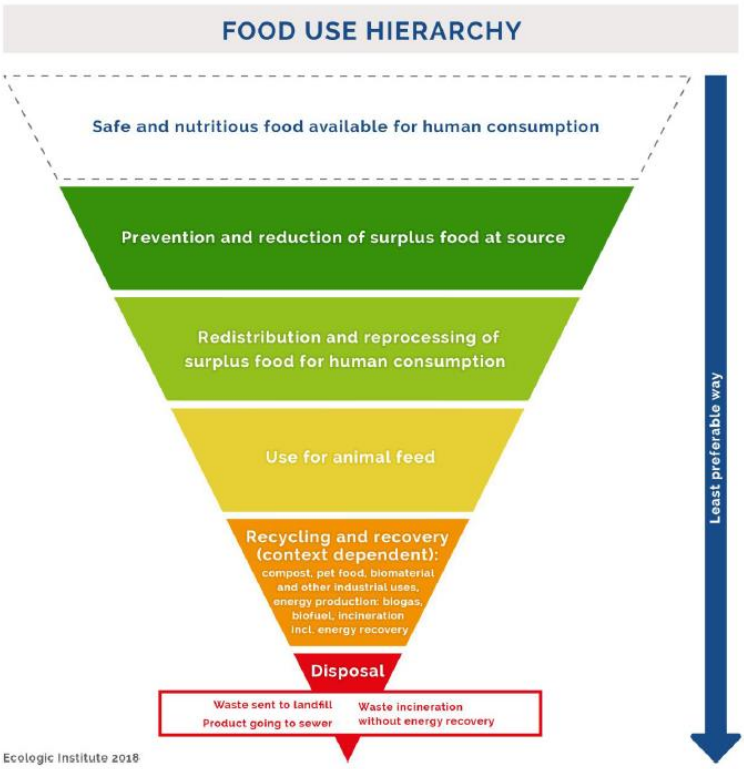
- Bioenergy: The use of biomass (including food waste) contributes to the production of renewable energy and achievement of the climate policy goals of the EU. However, the use of food waste for renewable energy competes with more sustainable food valorisation routes such as prevention, reuse and recycling situated further up on the food use hierarchy. The food use hierarchy could be applied in strong guidelines for generation of energy and/or biofuel from food waste. In addition, requirements about renewable energy in transport, notably on food-based biofuels in the new Renewable Energy Directive reference for 2020-2030 will need to be carefully designed in order to not (further) incentivize the utilization of food for energy, when the food could still be used for human consumption or animal feed.

- On-pack product information and date labelling: The issues that food businesses will need to address include achieving greater consistency in how date labels and on-pack advice to consumers are applied, and setting of longer shelf-life (where appropriate) without compromising food safety. One element would include actions to address unnecessary 'use by' dates on products where 'best before' would be more appropriate. Reform is unlikely to happen without National Competent Authorities playing a more active role in both enforcing current non-conformity with the FIC Regulation and providing a framework for date code simplification. Further consumer campaigns would be required to improve current understanding of on-pack labelling and date marks. This work would be needed at the MS level, with campaigns reinforced by retail sector involvement. Better layout of date marks on-pack and more visual date label/storage advice logos could be introduced, based on consumer testing. At the EU level, guidance on interpretation of FIC Regulations and sharing of best practice across the EU to include on-pack labelling, the setting of product life, the choice and layout of date marks could be introduced.

- Changing consumer behaviour: Policy makers have options to affect consumer behaviour through instruments such as public campaigns and through contextual settings. These can be used to influence consumers' motivation, their skills and knowledge, as well as opportunities available to them, which are key factors that determine household food practices and thereby household food waste. Both existing academic knowledge as well as insights from the REFRESH project provide practical guidelines for attempts to influence consumer behaviour. With regard to public campaigns these include (1) emphasizing that attempting to prevent food waste is "normal" consumer behaviour, (2) convincing consumers that they are able to change their behaviour, (3) making information on planned shopping and cooking with leftovers available, and (4) providing information on storage and shelf-life at moments when consumers are engaged in these household practices.

- Voluntary cooperation in the food chain: Voluntary cooperation across the whole food supply chain can be a valuable complement to regulation in the area of food waste prevention. Key factors leading to the success of such voluntary agreements are having government backing and an independent source of evidence, support and guidance. REFRESH is looking to establish pilot voluntary frameworks for action to tackle food waste in four European countries, to inform future guidance. Good current examples include the UK's Courtauld Commitment and the EU Supply Chain Initiative. The EU Platform on Food Losses and Food Waste is developing guidance and sharing of best practice; these should encourage more voluntary cooperation.

While the above mentioned opportunities are likely to provide improvements for food loss and waste prevention and valorisation, they are unlikely to achieve the full transformative change that is aimed at through the SDGs in general and ambitious food waste targets in particular, as major conflicting objectives within different policy areas are not yet resolved.



The development of an ambitious and coherent strategy for the implementation of the SDGs in Europe (that has so far not yet been developed) can therefore be an important catalyst, with synergies for food waste prevention and valorisation. Using the flexibility for countries that the SDGs provide to specify the implementation according to regional needs, the EU can lead by example by aiming for an ambitious implementation of the SDG 12.3 food waste target and include halving food losses and food waste in primary production in its scope (currently only retail and consumer level food waste are included).

Furthermore, a process and/or policy to define the overall EU objectives, strategies and instruments with regard to food in general (not only food waste), e.g. through an EU Food Policy, can be a relevant step to address many of the trade-offs and improve the development of synergies. The food use hierarchy suggested below that emphasizes the need to keep food in the human food chain as long as possible and to use resources effectively before they are recycled, recovered or disposed can act as a guiding principle for policy design.

Annex 2: Conference proceedings Food 2030 (EC 2017)

Executive Summary

The conference entitled 'Harnessing Research and Innovation for FOOD 2030: A science policy dialogue' held in Brussels on the occasion of World Food Day on 16th October 2017 highlighted successful European research and innovation (R&I) outcomes relevant to Food and Nutrition Security and provided inspiration for further development of priorities which will play a key role in achieving the objectives of FOOD 2030. R&I will play an increasing crucial role in future-proofing our food systems as the compounded, multifaceted effects of climate change, urbanisation, population growth and resource scarcity converge, intensify and impact the everyday lives of people.

Main conclusions on need to adopt a systems approach to R&I:

- Aggregating research within the 'food systems context' is a crucial element that needs to be defined in a precise way with clear boundaries [von Braun].
- The food system must include science by default by providing room for breakthroughs allowing academic freedom, long-term funding, and allowing people to think different [Fresco].
- The role of R&I in food systems is crucial to support long-term EU targets, MS and regional priorities, relevant to natural resource management priorities, climate action, soil, air, water and biodiversity [Haniotis].
- R&I in food systems needs to tackle the complex phenomenon of migration for the long term [Amaral].
- R&I has the opportunity to strengthen policy coherence and coverage in food systems, as well as the targeting of actors with influence [Maguire].

Main Conclusions from panellists:

- Catalysing positive change in food innovation ecosystems will require integrated approaches to connect multiple actors of value networks.
- New ways of engaging and empowering consumers and primary producers in innovations in food systems are needed.
- FOOD 2030 should cover issues and target companies needing disruptive, as well as incremental innovations, the latter of which currently predominate.
- FOOD 2030 should address the lack of venture capital/entrepreneur openings in EU.
- There is an urgent need for infrastructure to perform nutrition and health surveys of all population groups, including European residents of ethnic minority, central eastern European countries and vulnerable subgroups.

- There is a need for more face-to-face interactions with policy makers and implementation mechanisms for research results to have measurable impact.

- The understanding of the relationships between ‘diversity’ and ‘resilience’ in food systems needs to be broadened and defined.

- Integration of different forms of knowledge (i.e., evidence-based, experimental, embodied experience), underpinned by different values (i.e., socio-environmental justice, economic competitiveness etc.) must be strengthened in R&I for food systems.

- Different policy areas and value chains can be combined through FOOD 2030 for better value-based governance systems and to achieve a positive impact.

- Social innovation/research has an important role in food system transformation, for example for avoiding, reducing and adding value to food waste.

- For the development of new products or by-products related to the circular economy it is important to go beyond the classical sectors and have a close look at the demand side. Cooperation with industry in this frame is also needed.

Annex 3: Innovator's Handbook (FAO/INRAE 2020)

Abstract

Sustainable food systems are fundamental to ensuring that future generations are food secure and eat healthy diets. To transition towards sustainability, many food system activities must be reconstructed, and myriad actors around the world are starting to act locally. While some changes are easier than others, knowing how to navigate through them to promote sustainable consumption and production practices requires complex skill sets. This handbook is written for "sustainable food systems innovators" by a group of innovators from Asia, Africa, the Americas and Europe who are leading initiatives to grow, share, sell and consume more sustainable foods in their local contexts. It includes experiences that are changing the organizational structures of local food systems to make them more sustainable. The handbook is organized as a "choose your own adventure" story where each reader – individually or in a facilitated group – can develop their own personalized learning and action journeys according to their priorities. The topics included in this handbook are arranged into three categories of organizational innovations: engaging consumers, producing sustainably, and getting products to market.

Definitions:

An "INITIATIVE ON SUSTAINABLE LOCAL FOOD SYSTEMS" refers to the group of activities related to production, processing, exchanging, research and education that gather people and organizations working together to make local agri-food production and consumption more sustainable. In most cases, this refers to the group of actors that is the core facilitator of sustainable practices within their local food system (e.g. Familia de la Tierra, Freshveggies PGS, Bhoomi Ka).
Source: FAO, 2016; 2018.

A "SUPPLY CHAIN" is a sequence of (decision-making and execution) processes and (material, information and money) flows that aim to meet final customer requirements and that take place within and between different stages along a continuum, from production to final consumption. The supply chain does not only include the producer and its suppliers, but also, depending on the logistic flows, the transporters, warehouses, retailers, and consumers themselves. In a broader sense, supply chains may also include new product development, marketing, operations, distribution, finance and customer service (FAO, 2007).

A SUSTAINABLE FOOD SYSTEM (SFS) is a food system that delivers food security and nutrition for all in such a way that the economic, social and environmental bases to generate food security and nutrition for future generations are not compromised

(HLPE, 2014).

A FOOD SYSTEM comprises all the elements (natural resources, people, inputs, processes, infrastructures, institutions, produce, etc.) and activities related to the production, processing, distribution, preparation and consumption of food, as well as the outputs of these activities, including socio-economic and environmental outcomes (HLPE, 2014). In this handbook, we also consider end-of-life waste management as an essential element of a food system.

INNOVATION is the process by which individuals or organizations master and implement the design and production of goods and services that are new to them, irrespective of whether they are new to their competitors, their country or the world (FAO, 2014). "Innovation in agriculture cuts across all dimensions of the production cycle along the entire value chain – from crop, forestry, fishery or livestock production to the management of inputs and resources, to organization and market access. It may, for instance, involve planting new crop varieties, combining traditional practices with new scientific knowledge, applying new pest control and post-harvest practices or engaging with markets in new, more rewarding ways. Innovation is not just about technology, which on its own may simply remain on the shelf. It is also, and perhaps most importantly, about social, economic, institutional/organizational and policy processes, and having an impact on the lives of family farmers" (FAO, 2018d).

School gardens (France)
School gardens are perhaps the best way to get children and their families to understand and commit to sustainable food. In Jean Guehenno primary school, in Caen, Normandy, as in thousands of schools around the world, school gardens have been used as a multi-faceted educational tool. Even if space is limited in an urban environment, it is always possible to grow something edible. Besides, growing food is an exciting pedagogical activity; it is a way to learn about nature, plants, sun, water, wind, and seeds from an early age. There are many possible approaches. Children can cook the edible products harvested from the garden and sing songs about vegetables or gardening. They can also learn about the differences between plants and vegetation in different parts of the world. The economics of production and consumption can be calculated, and the basics of sustainability can be taught. A school garden is more than a single class project. It is a school project: different teachers may choose different ways to relate to the same garden. It is also a community project: parents and local food activists can be associated with the activities. In the Jean Guehenno school, parents partake in visits to the nearby pedagogical farm, whose growers helped to set up the school garden. These volunteer parents are trained on the spot as workshop facilitators for the day: some parents are responsible for organizing a game on the classification of plant "families"; while others facilitate blind tests about vegetables. The key is to make full use of the farm visit by preparing it in advance and by remembering the material learned there during the following classroom lessons. A school garden is a very efficient way to keep these memories alive, as it requires regular commitment. *Source*: Jocelyn Parot, URGENCI

School programme to educate future consumers (Kenya)
In Kenya, the Schools and Colleges Permaculture Programme (SCOPE) is a networking organization that currently has 18 member-NGOs and works with schools and communities in 12 counties across the country. Its main objective is to nurture and prepare youth in and out of schools to understand nutritional value, to learn about healthier consumption practices, and to participate in agricultural

production. To do so, the programme adopts the integrated land-use design (ILUD) approach. ILUD is a holistic step-by-step process that involves working with all the schools' actors– students, teachers, parents and local leaders – and uses the entire school ground to design and establish a school garden based on the principles of permaculture.

The approach is based on the following steps:

1. Situational analysis: actors observe the existing situation to develop a common understanding of the current problems and potential resources that they currently have.
2. Holistic goal formation: actors define their vision for the school environment.
3. Integrated design: actors re-design their land by creating connections between the various elements in their environment.
4. Plan of action: actors develop an implementation and monitoring plan for their project.

This process provides children with an opportunity to grow up in environments where they learn about and practice the production, preparation and consumption of healthy foods. It is important that the garden becomes a living part of the school curriculum and that students become actively engaged in the different activities – from planning, through growing and harvesting, to eating.

Source: Rosinah Mbenya, PELUM

To know more, visit: **www.fao.org/docrep/009/a0218e/a0218e00.htm**

Annex 4: Farm to Fork Strategy (EC 2020)

P.14: […] it will also review the EU school scheme to enhance its contribution to sustainable food consumption and in particular to strengthen educational messages on the importance of healthy nutrition, sustainable food production and reducing food waste.

The Farm to Fork Strategy is at the heart of the European Green Deal aiming to make food systems fair, healthy and environmentally-friendly.

Food systems cannot be resilient to crises such as the COVID-19 pandemic if they are not sustainable. We need to redesign our food systems which today account for nearly one-third of global GHG emissions, consume large amounts of natural resources, result in biodiversity loss and negative health impacts (due to both under- and over-nutrition) and do not allow fair economic returns and livelihoods for all actors, in particular for primary producers.

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

The Farm to Fork Strategy aims to accelerate our transition to a sustainable food system that should:

- have a neutral or positive environmental impact
- help to mitigate climate change and adapt to its impacts
- reverse the loss of biodiversity
- ensure food security, nutrition and public health, making sure that everyone has access to sufficient, safe, nutritious, sustainable food
- preserve affordability of food while generating fairer economic returns, fostering competitiveness of the EU supply sector and promoting fair trade

The strategy sets out both regulatory and non-regulatory initiatives, with the common agricultural and fisheries policies as key tools to support a just transition.

A **proposal for a legislative framework for sustainable food systems**will be put forward to support implementation of the strategy and development of sustainable food policy. Taking stock of learning from the COVID-19 pandemic, the Commission will also develop a **contingency plan for ensuring food supply and food security**. The EU will **support the global transition** to sustainable agri-food systems through its trade policies and international cooperation instruments.

To enable and accelerate the transition to a fair, healthy and environmentally-friendly food system, advisory services, financial instruments, but also research and innovation are instrumental as they can help resolve tensions, develop and test solutions, overcome barriers and uncover new market opportunities.