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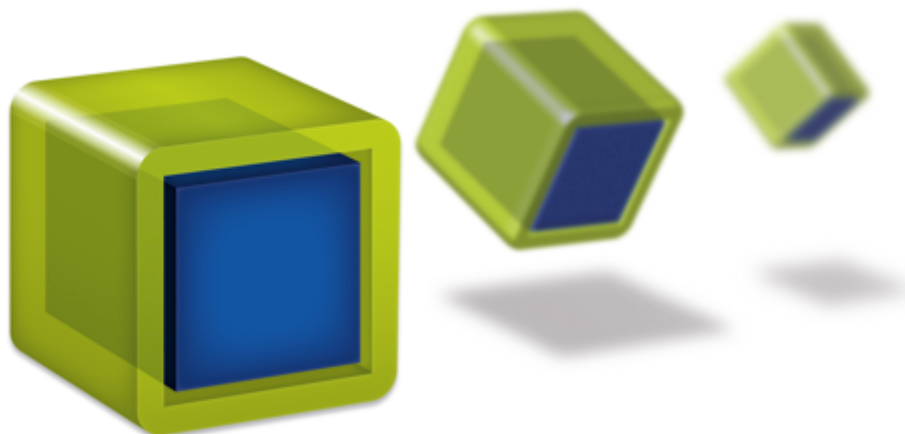
Shaping the future of Sustainable Food Consumption: Challenges and opportunities for policy and science integration

2nd Multinational Knowledge Brokerage Event on Sustainable Food (Lisbon, 18-19 April 2013)

Final Version, 16 April, 2013

RESPONDER - linking **RE**search and **PO**licy making for managing the contradictions of sustain**AB**le consumption and **E**conomic **g**rowth

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EXECUTIVE SUMMARY

This paper provides an introduction on the core issues of the RESPONDER project and the 2nd Multinational Knowledge Brokerage Event on Sustainable Food, in order to promote active participation and engagement in the debate.

The overall aim of RESPONDER is to promote sustainable consumption by exploring novel ways of knowledge brokerage that help to improve the management of potential political, social and economic contradictions of economic growth. The challenge is not just to bridge the gap between science and policy, but also to improve mutual understanding between the “pro-growth community” and the “beyond-growth community”. RESPONDER aims to improve mutual understanding and knowledge transfer between these groups by using participatory systems mapping as a core methodology. Knowledge brokerage means that the project will not conduct new research, but rather exploit existing research by new integrative modalities of linking research results to policy-making. This approach will be explored in a series of Multinational Knowledge Brokerage Events focused on five sectoral policy areas – food, housing, household electronics, mobility and private savings/debts.

The 2nd Multinational Knowledge Brokerage Event brings together policy-makers, high-level scientists, and business representatives to address pressing questions regarding the potential for, and challenges of sustainable food, and to provide impetus for effective policy. We will specifically explore the following questions:

- What will sustainable food consumption look like in the future, and which are the trends, policies and values shaping tomorrow’s food chain system?
- How to promote sustainability in the food chain and foster transitions towards sustainable food consumption lifestyles?
- Which are the key drivers and bottlenecks for sustainable development of land and aquatic food production systems?
- How to limit food losses and food waste and tackle its root causes? Which food waste policies are needed to pave the way towards sustainable food consumption?
- How to move towards effective sustainable food governance structures and policies in the real world?

This paper first outlines some of the key **trends and hotspots** in the sustainable food consumption debate. It subsequently provides a brief review of recent **food scenarios and visioning** studies, summarizing the **challenges and pathways** for shaping the future of food consumption and production. We then look into possible sustainability implications on the food chain. In the paper, we outline the main **environmental and health issues from food production and consumption** and then focus on the emerging topic of food waste, focusing on **food waste trends and drivers**. The last chapter then briefly presents some of the challenges concerning reform of the food governance structures, policies and initiatives that will be required to promote **transitions towards sustainable food systems**.

Finally, we briefly outline the meeting agenda and inform about the system maps that will provide a springboard for discussions during the event.

1 The RESPONDER journey: Aims and Desired Outcomes

RESPONDER aims to promote sustainable consumption by exploring novel ways of knowledge brokerage between science and policy in the five policy-areas of food, housing, mobility, ICT, and private savings and debts. The main objectives are to help improve the management of potential political, social and economic contradictions of sustainable consumption with economic growth, bridge the gap between science and policy, and foster mutual understanding between the “pro-growth community” and the “beyond-growth community”. Participatory systems mapping as the core methodology serves as the basis for systematizing empirical findings, questioning various model assumptions, analysing the effects of different policy options and identifying new research questions in the respective policy areas.

In the 1st Multinational Knowledge Brokerage Event (MKBE) on sustainable food, which took place in Lisbon in January 2012 (http://www.scp-responder.eu/events/kb_food), we have set the stage for an extended dialogue addressing strategies, policies and initiatives for sustainable food consumption and production. Conclusions from the workshop pointed out to the multi-layered challenges in this consumption field, where no ‘silver-bullet’ may be prescribed and changes are needed in several fronts: from local to regional and global scales, from production to consumption stages of the food chain system, improving health and ecological conditions both in regions of prosperity and austerity, implementing ‘bottom-down’ strategies as well as ‘from the ground up’ initiatives.

“Shaping the Future of Sustainable Food Consumption: Challenges and Opportunities for Policy and Science Integration” is the 2nd RESPONDER Multinational Knowledge Brokerage Event focusing on food and its role in economic growth and sustainable consumption. As such, it serves as an arena for on-going debate between policy-makers and researchers working on different aspects of sustainable food systems, and aims to explore open research questions and emerging policies with regards to its potential to foster sustainable consumption in Europe and arrive at a useful impetus for effective policy development. In the course of the event, in a dialogue-oriented atmosphere, we will have a closer look at emerging food consumption trends and their implications for sustainable food systems, examine the associated challenges and conflicting priorities, and discuss implications for policy-making. The event will focus on four thematic areas: an outlook into future sustainable food system pathways, its implications for sustainable food chain issues, particularly in the EU, lessons from initiatives to tackle food waste and challenges for governance of sustainable global food systems.

This background paper outlines the event context. It is intended to encourage a discussion on what kind of political interventions and activities are needed to go forward towards sustainable food systems. Thus, this paper provides a skeleton of thoughts and evidence, which will be explored in more detail over the course of the event.

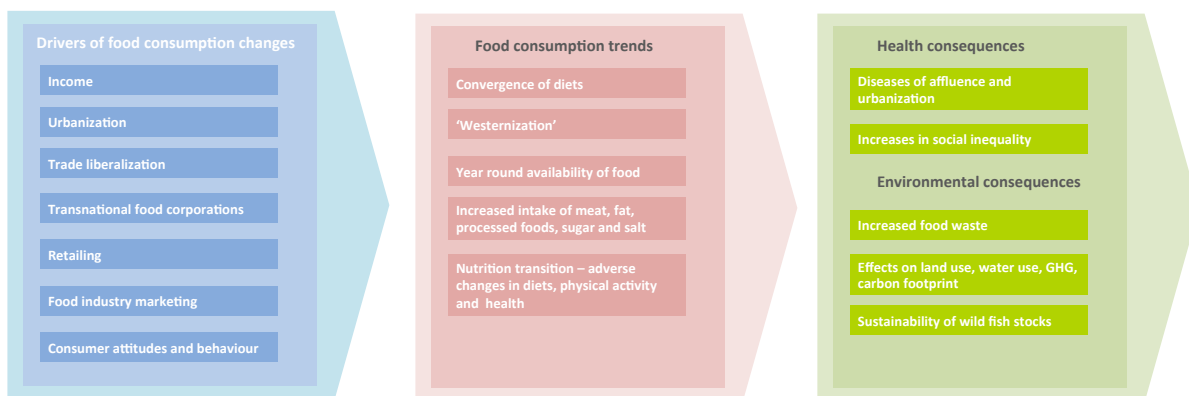
2 Introduction: food consumption trends and hotspots

Food is a crucial necessity in people’s lives. On the individual level, **sustainable food consumption** basically means obtaining and consuming sufficient amounts of nutritious and safe food to stay healthy and active as well as dealing responsibly with issues of resources, emissions and waste (Reisch, 2011). Beyond the individual level, however, consumers are part of a larger food system. A systems perspective allows for assessing the impacts of and interrelations between the actors within the food chains: production, processing, retail, consumption and disposal (of packaging). Moreover, a systems view is also crucial for analysing the socio-ecological processes of production, the political power and market control of the actors as well as social and cultural aspects of food production and consumption.

As the complexity and interconnectedness of the food system grows, we are facing the predicament of balancing food demand and supply sustainably. Growth policies in the supply sector have focused attention on **food security** and how to provide enough food for an increasing population in a globalized world. In this debate, concerns arise on the just and fair supply of food and drink to human beings, in a context of a globally growing population that will have to cope with the lack of available land and the approaching biophysical limits in some parts of the world.

The world’s food system faces multiple challenges and struggles to adjust to a combination of environmental, health, economic, societal and consumer changes (Lang, 2012). Kearney (2010) drew a “big picture” of the dominant worldwide **food consumption trends, drivers and consequences**, which are summarized in Figure 1. Some of the major patterns identified by Kearney (2010) include convergence of diets, year round availability of food products, ‘westernization’ of food habits, increase intake of meat, fat and processed foods, and nutrition transitions. Other authors add a shift toward consumption of ready meals, fast-food and out-of-home consumption (Tempelman, 2004), a decline in time spent on nutrition (Hamermesh, 2007) and a relative decline of consumer spending on food (Michaelis & Lorek, 2004; EEA, 2005).

Figure 1: Global food consumption trends, drivers and consequences (Adapted from Kearney, 2010)



These patterns emerge as a consequence of underlying socio-economic drivers such as increase in average incomes, urbanization, spread of transnational food corporations and food marketing/advertising, rise in supermarkets, and changes in consumer attitudes (Kearney, 2010).

In Europe, total consumption of food in the past decade has reportedly been relatively decoupled from income (EEA, 2005). The types of food eaten in Europe and food habits of Europeans have changed in recent years with increasing wealth, a change that is being exacerbated by falling household sizes, increasing globalisation of food markets and tastes and reduced time devoted to preparing food (EEA, 2005; EEA, 2012).

Trends in European Food Consumption (Source: EEA, 2012)

- **Fruit:** Increasing consumption by 11 % in the EU-15 in 1990–2005 (FAO, 2010). This may be due to greater availability and reduced prices of (imported) fruit;
- **Pre-prepared, frozen meals and convenience foods:** Rise in the purchase of these foods due to smaller household sizes and reducing time devoted to food preparation as more women enter the labour market (Omann et al., 2007);
- **Take-away food and eating out:** Increasing expenditure and frequency of eating take-away food and in restaurants (Omann et al., 2007; Danish EPA, 2004);
- **Food imports:** a dramatic increase in quantities of imported food. For example, meat imports to the EU-15 increased by 120 % between 1990 and 2007, cereal imports increased by 83 %, frozen vegetables by 174 %, and bananas by 92 % over the same period (FAO, 2010);
- **Bottled water:** a marked rise in the consumption of bottled water in many European countries (IBWA, 2010). Consumption in the EU was on average 105 litres per person in 2009, varying from 16 litres in Finland to 189 litres in Italy (EFBW, 2010).

As a result from these trends, **health and environmental concerns** arise, due to consequences such as **overconsumption of resources**, increased **environmental emissions** and **food waste** (Ventour 2008) and raising **overweight, obesity** and other **non-communicable diseases** [NCDs] (World Health Organization [WHO], 2010; European Commission, 2006). These impacts are influencing perceptions of global consumers, with an increasing concern for health awareness, healthy lifestyles and overall well-being (Reisch & Gwozdz, 2010; OECD, 2001; European Commission, 2006). Some of these sustainability issues in the food chain will be exposed in more detail in Chapter 4.

3 Food visions and scenarios

Prospective studies approaches, such as scenarios and visioning, have been instrumental in supporting planning, assessment and implementation of decisions regarding environmental and sustainability issues (EEA, 2009), serving a variety of purposes, such as policy analysis, raising awareness, broadening perspectives, synthesising information, dealing with uncertainty and complexity and promoting public participation (Alcamo, 2001; Martelli, 2001; Swart et al., 2004).

Scenarios are alternative images of how a future might unfold (Alcamo, 2001), thus depicting coherent and plausible stories about possible, and often contrasting, co-evolutionary pathways of human and ecological systems (Swart et al., 2004).

Different approaches for building scenarios distinguish, for example, between “exploratory” and “anticipatory” processes. The former, also known as “descriptive” or “forecasting” scenarios, usually begin in the present and explore trends into the future (Alcamo, 2001). On the other hand, anticipatory scenarios start with a prescribed vision of the future (either optimistic, pessimistic, or neutral) and then work backwards in time to figure out how this future could emerge (Alcamo, 2001). The term “backcasting” is



frequently used to describe a particular anticipatory approach wherein normative scenarios are developed backwards from a particular “desired end-point” or set of goals (Robinson, 2003).

A “vision” for an organisation, group or community is understood as an image of what they desire to be, and which they have the power to bring to life (O’Brien and Meadows, 2001). The process of developing a vision – “visioning” or “envisioning” – is concerned with eliciting desirable futures, wherein a coherent and relatively detailed, shared vision of both the way the world works and of the society we wish to achieve is developed (Costanza, 1997; Meadows, 1996).

Within the scope of the 2nd RESPONDER MKBE on sustainable food, we plan to build on current debates on the forces shaping the future of sustainable food systems, prompted by the lead question of “What will sustainable food consumption look like in the future?”. In this section, we provide an overview of a selection of prospective studies published in the recent years in the area of food and agriculture, both at global and regional/national scale (Figure 2). In Table 1 we summarize key insights from these publications.

Figure 2: Food visions and scenarios developed in recent years, both at global and EU/national scales



Table 1: Overview of key messages from recent food scenarios and visioning studies

Study	Approach/methods	Key messages regarding the future of sustainable food systems
2052 – A global forecast for the next forty years (<i>Randers, 2012</i>)	<ul style="list-style-type: none"> 70 years (1972-1952) Forecasting approach Spread sheets backed up by two global computer models simulating feed-back effects 	<ul style="list-style-type: none"> Food safety forecasts point to the conclusion that food production will satisfy demand; Production will continue to grow over the decades ahead and demand will not increase as much as expected; Consumers in developed countries will eat less meat and refined foods requiring less agricultural output; Food will continue to be unevenly distributed in 2052; Humanity will accept risks of GMOs because their benefits arise in the short term and ecological costs in long term; Land area for cultivation will slightly increase; intensity of the use of land will increase more sharply; As we get closer to 2052, agriculture will be increasingly affected by climate change (more CO₂ in the atmosphere and higher temperatures will possibly impact food production in opposite directions).
Foresight. The Future of Food and Farming (<i>The Government Office for Science, London, 2011</i>)	<ul style="list-style-type: none"> 40 years (2010-2050) Forecasting approach IMPACT model of global food system and GLOBE model exploring changes in trade policy 	<ul style="list-style-type: none"> Critical importance of broad coordination and interconnected policy-making, not only from within the food system players (e.g. considering implications for volatility, sustainability, climate change and hunger) but also in conjunction with other sectors outside of food (e.g. energy, water, land use, ecosystem services and biodiversity); Substantial changes will be required throughout the different elements of the food system and action has to occur on several fronts simultaneously (e.g. sustainable production, contain resource-intensive types of food, minimise waste, improve political and economic governance); Develop a strong evidence base upon which to make informed decisions and restrain from eliminating diversity of policy options; Addressing climate change and achieving sustainability in the global food system are crucial imperatives; Eradicating hunger and giving greater priority to rural development and agriculture as a driver of broad-based income growth; The report rejects food self-sufficiency as a viable option for nations to contribute to global food security, encouraging a food system governance model that maximises the benefits of globalisation and their fair distribution.
From environmental concerns towards sustainable food provisioning (<i>Risku-Norja, 2011</i>)	<ul style="list-style-type: none"> Forecasting approach Model based scenarios and material flow analysis 	<ul style="list-style-type: none"> The food consumption scenario approach explored, at the national level, the contribution of the soil, production animals, fertilizer use and energy consumption to the agricultural GHG emissions and to assess the possibilities to reduce GHG emissions through diet changes, considering both conventional and organic production. Regarding GHG emissions the environmental performance of organic production is poorer than a strict vegan; The study concluded that negative environmental impacts of primary production can be reduced through changes in food consumption habits but changes can only be gauged over a very long time span. Responsibility cannot be pushed solely onto the consumers and their food choices – expected significant improvements from developing services and effective policy to gear consumer behaviour and promote environmental and human health. Institutional consumers provide a more effective channel for introducing new food consumption habits (both through higher volumes of food purchases and civic education). Consumer information on the impacts of food choices will be an important part of civic food education.
Realizing a New Vision for Agriculture (<i>World Economic Forum, 2010</i>)	<ul style="list-style-type: none"> Visioning approach 20 years (2010-2030) Developed over 18 months by 17 global companies and several stakeholder groups 	<ul style="list-style-type: none"> Increase agricultural production by 20% each decade and substantially reduce waste, towards the elimination of hunger and undernourishment; Reduce emissions per tonne of production by 20% each decade, optimize overall water use, lessen agricultural impact on the environment; Drive rural and national economic development with well-targeted investments in order to decrease the proportion of rural inhabitants living on less than US\$ 1.25/day by 20% each decade; Operating principles for the vision include: i) mobilizing the private sector to unleash agriculture as core driver of future growth and stability, ii) employ market-based solutions to activate public and private investments, iii) empower farmers and entrepreneurs to reach their full potential; iv) integrate policy interventions to achieve momentum and scale, v) Promote stakeholder collaboration across the value chain to build on strengths and distribute risk.

Study	Approach/methods	Key messages regarding the future of sustainable food systems
<p>FoodWeb 2020 – Forces Shaping the Future of Food (<i>Institute for the Future, 2010</i>)</p>	<ul style="list-style-type: none"> Forecasting approach 10 years (2010-2020) Foresight- insight-action framework 	<ul style="list-style-type: none"> Eight critical forces/disruptions are reshaping the future of food: 1) new taste imperatives (e.g. ubiquity of products once local and seasonal) are straining the capacities of the food web, 2) growing food fears, as the distance from production and consumption increases, 3) new attention to health impacts, 4) upsurge in food rights activism (local empowerment versus remote land control), 5) increasing cost volatilities, 6) cascading environmental emergencies, 7) growing demand for sustainability metrics (e.g. food footprints, life cycle labels), and 8) expanding push toward carbon neutrality; Five key shifts in the food web are forecasted: 1) greater transparency through labelling and consumers developing a more personal relationship with food sources; 2) preservation of crop biodiversity by deemphasizing mono-cropping and standardized foods, and offering locally differentiated products; 3) decentralizing food production and distribution with increasing demands for safe, local and sustainable foods, 4) Reduction of food’s environmental footprint and reduction of resource consumption in resilient life cycles, and 5) Increased collaboration to improve capacities and sustainability at both local and global scales.
<p>Food 2030 (<i>DEFRA, 2010</i>)</p>	<ul style="list-style-type: none"> Visioning approach 20 years (2010-2030) Vision informing development of governmental food strategy 	<p>Envisages a sustainable food system whereby in 2030:</p> <ul style="list-style-type: none"> “Consumers are informed, can choose and afford healthy, sustainable food. This demand is met by profitable, competitive, highly skilled and resilient farming, fishing and food businesses, supported by first class research and development; Food is produced, processed, and distributed, to feed a growing global population; Our food security is ensured through strong UK agriculture and food sectors and international trade links with EU and global partners, which support developing economies; The UK has a low carbon food system which is efficient with resources – any waste is reused, recycled or used for energy generation”.
<p>Thinking About the Future of Food (<i>Chatham House, 2010</i>)</p>	<ul style="list-style-type: none"> Forecasting approach Medium term (5, 10 and 10+ years) Model based scenarios and narratives 	<ul style="list-style-type: none"> Scenarios were built considering four shaping forces: i) the changing oil price, ii) the growth of global demand on food, iii) the supply capacity and iii) global and economic answers to the three topics. Story lines were developed in a participatory way with research teams and experts in the given topic; Scenario implications and priorities for different stakeholder groups were identified: i) Agriculture – The sector’s importance increases as it faces growing pressures on input costs, thus, priorities include raising yields and productivity and promoting an efficient and resilient use of inputs (land, water and energy), ii) Industry – pressures on input costs combine with increasing competition for resources and raw materials thus resource use improvements are needed as well as improving trade partnerships, iii) Government – food costs contribute increasingly to inflation and a developing social divide, thus priority should be to balance food demand and supply with environmental and health objectives, and iv) Civil Society – high prices increase the importance of food and levels of concern are raised as the availability of some foods is affected and consumer choice narrows, which points to the need for developing a more broadly conceived strategy for UK food production and supply.
<p>Getting into the right lane for 2050, A primer for EU debate (<i>PBL, 2009</i>)</p>	<ul style="list-style-type: none"> Backcasting and visioning approach 40 years (2010-2050) Analysis largely based on modelling and other tools used in recent global outlooks 	<ul style="list-style-type: none"> Global vision is feeding nine billion people without further loss of biodiversity and minimising impact on ecosystems and climate and EU vision is to nurture diversity in agricultural practices including creating a buffer against ‘shocks’ in a very crowded world; Vision pathways highlights: i) increased agricultural productivity and system resilience (e.g. investing in technology globally, investing in diversified agriculture in the EU, the Mediterranean as a pioneer area), ii) influencing diets and reducing post-harvest losses (e.g. smaller demand for animal products and reduced food losses) and iii) protection of nature (e.g. protecting biodiversity inside and outside of the EU); Promoting policy integration is crucial: agriculture linked in multiple ways to climate change, agriculture and development policies in least developed countries, incorporating food security in food production strategies, strengthening the external dimension of EU policies For the EU, the critical path includes: i) investing on food systems research, ii) make diversity a strategic aim of the CAP, iii) facilitating debates on reducing meat consumption, iv) prioritise, protect and pay for ecosystems.

The key messages in the reviewed studies highlight the need for a systemic view of the food system and an integrative approach to food policy. As highlighted by Lang (2012) a decent food system for the 21st century will strive to address multiple challenges (Table 2), and needs to look critically into the questions of “Who gains, who loses?”, “What needs to happen?”, “What are the costs and benefits?” when promoting a thorough discussion on alternative future food policy pathways.

Table 2: Current challenges and possible pathways to shape the future of food (Source: Lang, 2012)

Current challenges	Possible future pathways
<ul style="list-style-type: none"> • Price volatility seems to be the new norm with prices edging higher → impact on health and the dietary choices of people on low-income countries; • Structural mismatch of human bodies, food supply and environment → under, over and mal-consumption co-exist in the world; • 20th century pursuit of cheaper food from more efficient food supply chains → externalisation of unexpected costs for health, environment and social inequality; • Paradigm of unproblematic advantages of producing more food is shifting → cheap and plentiful food does not automatically yield better health and wellbeing, mainly due to distortions from mal-distribution and mal-consumption; • Uncertainty of political will and disparate leadership → there is no clear vision currently shared at global or regional levels in the West; • Fissures in food governance and increasing policy complexity → Large food businesses are increasingly challenged by the forces shaping the future of food and parallel systems have emerged from state, commercial and civil society players. 	<ul style="list-style-type: none"> • Business as usual → Health gains will emerge from wealth generation, so let economies thrive and enable populations to have more disposable income; • Leave it to the food business → Companies are ‘choice-editing’ (e.g. altering recipes, product specifications and price signals), adopting corporate responsibility practices; • Sustainable intensification → the case for producing more food from less land, with fewer inputs and lower impacts; • Technical solutions → harness the power of genetics through personalised health solutions (in developed world) and strive for emergency relief for feeding the needy (in developing world); • Social justice at the global level → NGO coalitions and food justice campaigns take a global perspective, targeting political leaders in rich countries, calling for restructured trade rules, debt waiving and stops on transnational ‘tax dodging’; • Contract and converge → the rich developed world eats less and differently to allow the developing world to consume more; • Sustainable diets from sustainable food systems → new direction is covered by ‘low carbon and healthy’ diets, with multiple and integrated goals for food and health policy, such as quality, social values, environment, health, economy and governance; • Focus on plants - ‘plant the plate’ → diets are largely plant-based, urging populations to consume more fruit and vegetables, thus dropping production of meat and dairy, with expected positive effects on job creation in horticulture.

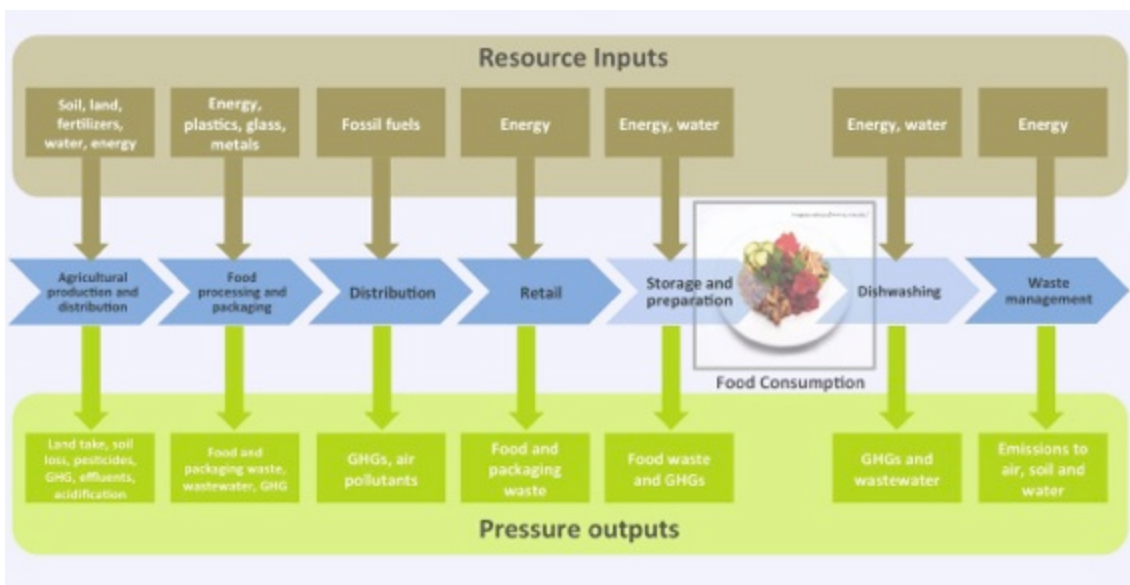
4 Sustainability issues in the food chain

4.1 Environmental and health issues from food production and consumption

Food consumption is one of the private consumption areas that have the largest impact on the environment. Approximately one third of EU-25 households’ total environmental impact – including energy use, land use, water and soil pollution and emission of greenhouse gases (GHG) – is related to food and drink consumption (Danish Environmental Protection Agency, 2004; EEA, 2005).

Environmental impacts occur at all stages of the food chain (Figure 3), with agricultural production and (to a lesser extent) industrial processing being responsible for the most significant impacts (EEA, 2012).

Figure 3: Food chain impacts on the environment (Source: adapted from EEA, 2012)



The **main categories of environmental impacts** associated with resource use and pressure outputs along the food value chain are summarized below:

- **Land usage and soil degradation** occurs mainly due to demand from agriculture for crop cultivation and livestock breeding (22% of all cropland, pasture, forest and woodland have globally already been degraded since the 1950s, cf. Schaffnit-Chatterjee, 2009, p. 9);
- **Water consumption** rises with meat based diets (Schaffnit-Chatterjee, 2009). The World Wildlife Fund For Nature (WWF, 2009) revealed that agriculture accounts for about three quarters of German water consumption (60% of this from abroad). Overall, the study estimates a per capita water consumption of nearly 4.000 litres per day just for food;
- **GHG emissions** are caused in particular by the use of mineral fertilisers and synthetic pesticides, livestock farming (in particular methane and nitrous oxide emissions), transportation, and energy for the packaging and processing of food, cooling and cooking; food production and consumption accounts for 18% (in UK) and 16% (in Germany) of total GHG emissions (Eberle, et al., 2006; BCO, 2008);
- **Water pollution** results to a great extent from pesticide use in agriculture; experts expect not only a further increase in pesticide use but also increasing absolute contamination due to the long persistence of pesticides in both soil and water (RSU, 2004);
- **Eutrophication** is caused by the use of fertilisers and NO₂ emissions from livestock breeding;
- **Biodiversity** assures food security in the long term; the use of agrochemicals in intensive farming and the replacement of local varieties of domestic plants with high-yield or exotic varieties have made important gene pools collapse (Schaffnit-Chatterjee, 2009; Foster, et al., 2006).

Health impacts from food consumption are another major issue of concern. About 800 million people worldwide are chronically hungry due to poverty and lack of access to food, while at least 1 billion people are overweight. Both extremes, stemmed from economic and social inequalities, bring several problems in the health sector.

According to the WHO, on top of health problems arising from food insufficiency and under-nutrition, NCDs are spreading globally due to increase in critical risk factors related to food, such as **unhealthy diets, overweight and obesity** (WHO, 2010).

Food-related risk factors contributing to Non-Communicable Diseases [NCDs] (Source: WHO, 2010)

- **Unhealthy diets:**
 - The risk for cardiovascular diseases, stomach cancer and colorectal cancer decreases with adequate consumption of **fruit and vegetables**;
 - **High salt consumption** is an important determinant of high blood pressure and cardiovascular risk; most populations consume higher levels of salt than recommended by WHO for prevention of such diseases;
 - Heart disease is linked to high consumption of **saturated fats and trans-fatty acids**; unhealthy diet is rising quickly in lower-resource settings with available data suggesting that fat intake has been rising rapidly in lower-middle-income countries since the 1980s;
- **Overweight and obesity:**
 - WHO estimates that at least 2.8 million people die each year as a result of being overweight or obese;
 - Risks of heart disease, strokes, diabetes and certain cancers increase steadily with increasing body mass index;
 - The prevalence of overweight is highest in upper-middle-income countries although very high levels have also been reported from some lower-middle income countries. In the WHO European Region, the Eastern Mediterranean Region and the Region of the Americas, over 50% of women are overweight. Overweight among infants and young children is more prevalent in upper-middle-income populations, while the fastest rise in overweight is in the lower-middle-income group.

Health risks do not only relate to food security and dietary habits, but also to **food safety**: the latter is defined as the presence of unwanted substances in food products, including pathogenic organisms, toxic substances and contaminants.

One of the most serious food safety issues in Europe is food-borne illnesses (DEFRA, 2008). According to the BCO (2007), 600 - 700 people died in Britain in 2006 as a direct result of something they ate, with the primary factor being food poisoning, followed by choking accidents. In addition, more than 300,000 cases of food poisoning are reported each year. According to one German risk assessment study on food-borne diseases (Eberle & Reuter, 2004), however, the highest health risks are related to active hormonal substances and bovine spongiform encephalopathy (BSE), followed by GMOs, pesticides and viruses/bacteria. The study also reported that health risks related to nitrates and the use of pharmaceuticals in livestock breeding are much higher than the risks related to the radiation of food and to food additives. Food-borne health risks also differ according to diet, with the lowest risks related to a vegetarian diet based on organically grown produce and the highest risks to a meat diet based on conventionally produced foods (Eberle & Reuter, 2004).

Food risks and food safety are among the highest concerns relating to food choices made by consumers. With the media covering many of food risk incidences, they cause anxiety to be propagated throughout society. One of the factors driving **food anxieties**, is the lack of transparent information sharing, such as happened in the recent **horse meat scandal** in Europe.

See also the Knowledge Unit on 'Food Risk and Safety'

4.2 Improving understanding on food waste

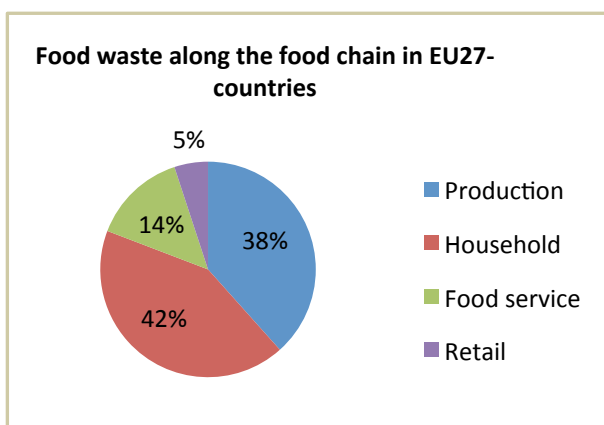
4.2.1 Food waste trends

Approximately 300 million tons of food is being wasted annually in all industrialized countries, this equals about 4,000 container-shiploads¹. According to José Graciano da Silva, FAO Director-General, “this is more than the total net food production of Sub-Saharan Africa, and would be sufficient to feed the estimated 870 million people hungry in the world”.² On a global scale, approximately 1.3 billion tons of food remains are thrown away yearly (Gustavsson et al., 2011, 4).

See also the Knowledge Unit on ‘Private Food Consumption and Food Waste in the EU’

Within the EU 27, 89 million tons of food waste are generated which corresponds to an environmental impact of approximately 170 million tons CO₂ equivalents (cp. European Commission 2010, 15)- these are 3% of the EU27 total annual CO₂ emissions. Continuing this trend, the number of discarded food within the EU 27 is expected to rise to 126 million tons by 2020, mainly because of expected population and income growth (cp. European Commission, 2010, 17).

Analysing the generation of food waste, private households represent the greatest share, being responsible for 42% of all food waste. The production side also makes up about 38% of the total amount. The food service sector and wholesale/retail represent 14 % and 5 % respectively (cp. European Commission, 2010, 15).



4.2.2 Causes of food waste

Food waste generation is not restricted to the end of the chain, but a challenge of the whole food chain stages. Nevertheless, private households and the food service sector are predominantly contributing to this challenge. To take a closer look, what are the main reasons and sources of food waste generation?

A large number of wasted parts cannot be avoided during **cultivation, processing and distribution of food**. Food parts in these stages are mainly discarded because they are inedible (e.g. bones or carcasses), and because they do not fit packaging or logistic demands.

In contrast, the amount of neglected food by **private households** and the **food service sector** highly depends on individual behaviour and habits. Personal preferences and presumptions on food handling play an important role. Therefore, we focus on private households, wholesale/ retail and the food service sector. There are a couple of reasons for wasting food:

¹ Assuming a container capacity of 3,000 TEU

² Cp. unep.org, 2013

- Current **label formulations** like “best before” or “least shelf life date” tend to stigmatize food as inedible from a certain date on. In addition, formulations addressed to retailers such as “display until” or “sell until”, favour food waste due to decisions made by shop assistants. According to the WRAP (2008, 139f.), judgements about the condition of food made on behalf of the printed date accounted for 15% of the total weight of discarded food. It is supposed to be the second most important reason for avoidable food waste.
- Unsuitable **storage and packaging** in private households and retail stores often leads to early decay of food that would last longer under appropriate conditions. Proper storage and packaging conditions vary between products, and also depend on household properties like temperature and equipment. Thus, it is assumed that incorrect handling caused by insufficient knowledge about specific requirements for products, and ignorance about appropriate household conditions, are at the root of food waste with regard to storage and packaging (cp. Save Food, 2011, 9 and 12).
- The selection of appropriate **portion sizes** is relevant for private households, wholesale/retailers and food service. With regard to private households, plate left-overs are responsible for 30% of avoidable food waste which is the greatest share among the examined reasons by WRAP (2008, 140). The large amount of left-over food is the result of incorrect assessment of one’s eating needs, which is especially problematic in single households (cp. WRAP, 2008, 5). Additionally, the overestimation of portions is favoured by special offers at retail stores. From a retailer’s perspective, it might be rational to buy great product bundles at once because it has a decreasing effect on cost. But from a consumer’s point of view, buying greater amounts of products than needed, is, in most cases, irrational in its consequences: the relative costs for food might be lower but the absolute food costs are higher. The same paradox rationale affects the food service sector, as canteens to prepare more food than customers manage to eat, just to be on the safe side. Buffets with an “all you can eat”-option are an example of deliberately calculated food waste.
- With regard to edible leftovers, inadequate **cooking skills** are another reason for food in perfect condition being rejected. The problem here lies within the low attention which is paid to cooking competences, be it at school or in the realm of private education. The consequences of this lacking basic knowledge leads to the incapability of many households to use their food resources efficiently. In connection with this, a shortage of time to prepare food creatively can lead to bland food and more remains being discarded. Yet, Western lifestyles may not be compatible with the abilities required to better and efficiently handle (fresh and other) food. Indeed, without developing the necessary skills of fresh food management consumers run the risk of throwing ever more foodstuff in the waste bin.
- **Personal preferences** of private households can also contribute to a large amount of avoidable food waste, such as edible peel from fruit and vegetables, or bread crust. This might be a result of habit, as well as lacking knowledge about the nutritional value of such food parts (cp. Gustavsson et al., 2011, 11). Presumptions about customers' preferences also influence the policies of retailers and food service suppliers. The manifold ranges of goods at any time of day offered by retailers are justified by the supposed consumer expectations. Consumers are believed to expect shiny looking food independent from time of day and season.

- Some studies name the **lack of menu planning** in private households as the major cause for food waste being responsible not only for discarded food remains but also for food that is thrown away even unopened. With respect to grocery shopping, little time resources and lacking reflection on personal diets contribute to the habit of few shopping tours with great amounts of food bought.
- The behaviour-related causes of food waste are connected to cultural and sociological factors, as well as house economics and individual skills. The types of purchased foodstuff and the related possibilities of storing them are not only responsible for a certain amount of waste, as other variables might play a more important role, such as nutrition habits and attitudes. Food consumption and food waste are also linked to the kind of diet people follow³.

Table 3 summarizes the main reasons for food waste and categorizes them by their main reasons.

Table 3: Reasons for food waste in private households and food service sector⁴;

Issue / Actor	Private household	Wholesale & retailer	Food service
Label interpretation	K,H	K,H	K,H
Storage and packaging	K,H	K,H	K,H
Portion size	H	“Rational choice”	H
Cooking skills	K		
Personal preferences	K,H	K (= presumptions on customers' preferences)	K (= presumptions on customer's preferences)
Lack of planning	H	H	H

Explanatory notes: H = Habit K = Knowledge

5 Promoting transitions towards sustainable food systems: governance priorities, policies and other initiatives

5.1 Food governance reforms and implications for stakeholders

The complexity and multiple dimensions involved in shaping the future sustainable food consumption call for strong governance structures and actions by the several players in the food system. Several, recent studies have pointed out the need to reform the food governance system at international, national and local levels, and several options are being debated.

In a report for OXFAM, Bailey (2011) argued that national governments’ top priority must be to tackle hunger and reduce vulnerability, by creating jobs, investing in climate adaptation, disaster risk reduction and social protection. At the international level, Bailey (2011) argues that governance must be transformed to reduce the risks of future shocks and increase effectiveness of responses, through actions such as managing trade rules and risks, reforming food aid, regulating commodity speculation and operationalizing a new global climate fund.

³ For instance, among the food wasted in a Turkish household, on average more than 30% is fresh vegetables and salads (cp. Pekcan, 2006 in Parfitt et al., 2010) and a similar percentage is fresh fruit.

⁴ This overview is mainly based on factors identified by European Commission (2010, 31-40).

In the “The Future of Food and Farming” project, the UK Government Office for Science (2011) presents detailed recommendations for governance reforms and key priorities of different players, including the following selected examples from this study:

- **UN and International Organizations** – e.g. develop the institutional mechanisms to allow a more integrated approach to food supply and security (including both terrestrial and aquatic systems); invest in a network of high-quality global, national and local food system and resource data; support the UN High Level Task Force and the FAO Committee on World Food Security in developing a coherent set of food indicators; recommend to FAO and partners, to lead an integrated cross-sectoral approach to sustainable, climate-resilient food security; implement genuinely pro-poor reforms of global trade within the WTO, promote the removal of distorting and environmentally harmful subsidies, the avoidance of trade restrictions at times of food stress, and increase efforts across the trade and sustainability agendas;
- **EU Member States and the EU Commission** – e.g. reform the CAP and CFP to incentivise capital investments that will deliver both a competitive agricultural sector and a marked improvement in sustainable food production, trade access and equity for producers and consumers; promote global leadership on subsidy and trade reform; prioritise food system research and development in the next EU Framework Programme; strengthen the EU’s presence and impact in international development support, food and resource data development, regional and international food security, poverty alleviation and climate mitigation and adaptation strategies; among other;
- **National governments** – e.g. move food further up policy agendas, taking a broad view of the whole food system and its linkages with other sectoral policies; develop and harmonise food system data and data standards; increase food literacy amongst consumers, enabling individuals to make informed decisions on the health, environmental and pro-poor consequences of the food purchases; working with community organisations and the private sector, locally to internationally, simplifying standards and assuring transparency for sustainable and equitable food production;
- **Private sector** – e.g. develop partnerships with public and NGO sectors and with smaller-scale producers, develop sustainable food systems, assembling data, communicating and marketing genuine achievements; improve food labelling to enable informed choices by consumers; work to form and strengthen farmers’ organisations to secure supply chains;
- **NGOs** – e.g. working together across sectors to tackle interlinked problems of hunger, food supply, poverty, rights to land and natural resource assets, health, human and institutional capacity, economic and social development, climate change, biodiversity and ecosystem services; building global alliances to communicate the extent of hunger in the world; identify and plug gaps in research not supported by the private and public sectors alone;
- **Research community and funders** – e.g. Prioritise natural and social science research in the sustainable food system, including fundamental knowledge base and outcome-led interdisciplinary work; target research investment in biotechnology and other relevant but currently neglected areas; rigorously assess the benefits and safety of novel technologies; increase development of new partnerships between public, private and third-sector funders; transfer knowledge and foster engagement with poor communities; improve data production and monitoring processes;

- **Citizens** – e.g. develop an understanding of the magnitude of the challenges facing the global food system; make strategic choices in food purchases helping to incentivise desirable behaviour in the food system; minimise household food waste; support governments in implementing policies to improve food system sustainability; support the work of NGOs.

5.2 Policy responses and other initiatives

Controlling the consequences of the food system impacts on the environment and human health will require concerted action and an alignment with a broad based vision for the future of sustainable food consumption. Thus, promoting transitions towards sustainable food systems needs to be informed by a discussion on the multiple policy responses and initiatives being implemented in the food system, such as the examples presented below.

In addressing environmental impacts for example, **EU responses** have been targeting several stages of the food value chain, in particular the source sectors – agriculture and fisheries. The two main pieces of legislation specific to these sectors are the Common Agricultural Policy [CAP] and the Common Fisheries Policy [CFP], which have both undergone recent revisions aiming at further reducing environmental impact (EEA, 2012). In the European Commission’s Roadmap towards a resource-efficient Europe (EC, 2011), there are specifications for reducing resource inputs and other food chain impacts, such as food waste (see box below). Other specific EU initiatives include the European Retailers Forum, aimed at promoting sustainable consumption and production through retailers (EEA, 2012). At the international level there are several recent important initiatives on sustainable food topics, such as the FAO-UNEP Sustainable Food Systems Programme.

Several **business-led initiatives** have also been developing recently to reduce pressures from food production, such as the multi-stakeholder platform created by the European Food Sustainable Production and Consumption Round table. This platform has recently developed, among other initiatives, the EN-VIFOOD Protocol which aims to support environmental assessments of food and drink products, and communicate environmental information along the food chain, including consumers (Food SCP Round Table, 2012). The contribution that Corporate Social Responsibility (CSR) regimes can play in the food sector has also been a subject of increasing debate. One means of managing ethical workplace conditions throughout global supply chains is to follow international standards (e.g. Social Accountability Standard 8000 or the ISO standard 26000).

Another emerging trend is the **localization of food initiatives**, which mainly look at rethinking the relationships of the individual consumers, small-scale farmers, food companies and national governments (Institute for the Future, 2010). Several initiatives developed ‘from the ground up’ are being implemented to influence the length and transparency of food supply chain (e.g. in order to reduce waste and environmental impacts) and empowering the links along the food system, thus creating more equal distribution of income and products.

In order to accommodate health concerns and more sustainable food consumption patterns, several innovative policies are also being deployed. Such is the case of **taxation of unhealthy foodstuff**, as happened in Denmark, for instance, where a fat tax was adopted, the first one in the world of its kind, which is expected to reduce the consumption of saturated fatty food stuffs (Gwozdz, 2011). Other policy instruments have been discussed to gradually **reduce meat consumption**, such as the elimination of the current system of subsidies for cheap meat production, in favour of major investments in healthier di-

See also the Knowledge Unit on ‘Local Food Initiatives’

ets, mainly plant-based (Popkin, 2009). “Green public procurement” and “no-meat days” are further examples that aim to achieve less meat consumption (Holm et al, 2010).

Food waste related initiatives

There are several approaches and initiatives intended to reduce food waste; they are not restricted to policy, but also to interventions of NGOs, business and social welfare organisations. The forthcoming “Roadmap to a Resource Efficient Europe” calls amongst others for reducing the disposal of edible food waste in European households.

Regarding the wholesale and retail sector, the re-distribution of unsold food and providing it to needy people is a way to prevent food waste. Organizations such as German Tafel e.V.¹ in Germany have established a nationwide network of voluntary workers, who collect food that would otherwise have been thrown away by producers and retailers. The food is then distributed in shop-like facilities. Regarding fresh food like bread or vegetables, retailers might avoid wasting products by reducing the price of these products after a certain time of day in order to prevent such products from being replaced by fresh food the next day (cp. Kreutzberger/Thurn, 2012, 209f.). Another example is an initiative by the British retail chain Tesco: According to the headline “Buy one, get one free later”, consumers are encouraged to buy products that are soon perishable. Doing this, they gain vouchers, which can be changed for another perishable product the following week¹. Additionally, the claim by retailers that consumers demand a great variety of perfectly shaped food has got to be questioned as data on consumer preferences indicates otherwise. Consumers might have a higher tolerance towards the appearance of food than retailers assume (cp. Gustavsson et al., 2011, 11). Also the European Commission has reacted to this problem by phasing out regulations on aesthetic requirements for fresh goods (cp. European Commission, 2010, 102).

In the **food service sector**, restaurants or canteens could provide different serve sizes (Small, Medium, Large) on menus, as practiced in some Asian countries (cp. Kreutzberger/Thurn, 2012, 210). The practice of taking leftovers home could be promoted by a public campaign, because people often hesitate to ask for “doggy bags”. For both the food service sector and wholesale/retail, re-use of food for industrial purposes is another possible means of reducing food waste. The German company “Re-food”, for example, has specialized in the recycling of food remains. Discarded food is reused, e.g. to gain energy by bio-gas facilities.¹ Similar to redistribution initiatives set up with retailers, the Italian program “Buon Samaritano” collects food remains from school canteens and delivers these leftovers to needy people. The organization has redistributed since 2005 more than 115 tons of food.¹ An example of the management of portion sizes and planning issues is the project “A la carte menu” in a Danish hospital. This has led to a reorganization of the catering system so that patients were supplied with a la carte menus instead of standardized portions. This led to a decrease in food waste of about 40 tons per year (cp. European Commission, 2010, 103).

In the **private consumption sector**, the function of expiry dates is a critically discussed point. The European Parliament (cp. European Parliament, 2011, 30) has suggested that dual date labelling (‘sell by’ and ‘use by’) could be an instrument to use to reduce food waste both by retailers and households. But, this implies that consumers know about the relative reliability of these labels. Therefore, knowledge rising about label handling should be a starting point for campaigns. To improve storage and packaging habits, information about the right storing conditions for different types of food should be disseminated. The awareness campaign by Morrisons Supermarkets from the UK, for example, helps private households avoid food waste by providing them with storage advice, creative recipes or labelling information.¹ Also, the use of cling film or freezing fresh food that cannot be eaten on time should be promoted as means of food preservation (cp. SAVE FOOD, 2011, 9). In order to prevent consumers from buying more food than necessary, they should be encouraged to change their habits towards more frequent but smaller grocery purchases. Also the habit of writing shopping lists contributes to more rational shopping behaviour (cp. SAVE FOOD, 2011, 9). Furthermore, campaigns that emphasize the potential of creative cooking skills might avoid the waste of food that is assumed to be unusable. An example is a training program initialized by Bruxelles Environnement. This program offers free workshops in which participants gain creative cooking skills, with the aim of reducing avoidable food waste (cp. European Commission, 2010, 101). With regard to awareness-raising about ways to avoid food waste, the campaign “Love food, hate waste” by the British WRAP Institute constitutes a good practice example: this has resulted in a decrease in private household food waste of 13% from 8.3 million tons in 2006/2007 to 7.2 million tons in 2010 in the UK (cp. WRAP, 2011).

6 Knowledge Brokerage event on “Shaping the future of sustainable food consumption”

6.1 Outline of the Event

The second Multinational Knowledge Brokerage Event on Sustainable Food Consumption takes place on 18-19 April 2013 at Fundação Calouste Gulbenkian in Lisbon.

On **Thursday, 18 April**, the welcome session will start with an introduction of the general objectives and approach of the RESPONDER project by *Paula Antunes* (Director of CENSE, Center for Environmental and Sustainability Research, Universidade Nova de Lisboa). This will be followed by an address from *Fernando Santana* (Dean of Faculty of Sciences and Technology, Universidade Nova de Lisboa), the Representative from the Calouste Gulbenkian Foundation, and *Nuno Vieira e Brito* (Secretary of State of Food and Agrifood Research, Portuguese Ministry for Agriculture, Sea, Environment and Spatial Planning). Brokerage event facilitator *Peter Woodward* (Quest Associates) will guide the process and moderate discussions.

The workshop thematic sessions will be kicked-off by the first panel of experts in the session “Sustainable food systems outlook”. A keynote presentation by *Sirpa Kurppa* (Professor at MTT Agrifood Research Finland) will open the stage and describe some of the key trends and challenges shaping the future of food. This will be followed by the keynote presentation from *Tim Lang* (Professor at City University London, United Kingdom) who will address issues of sustainable diets from sustainable food systems and how to promote food policy integration. These presentations will set the scene for the core questions with which RESPONDER deals. The programme then continues with groups and plenary discussion to enrich perspectives on the future of sustainable food consumption and identify key issues and pathways.

Following the lunch break we move to session 2 “Sustainability in the food chain”. *Trudy Rood* (Senior Policy Research at PBL – Netherlands Environmental Assessment Agency, The Netherlands) will provide an overview of emerging sustainable food issues in the EU. The core part of Thursday afternoon will then be dedicated to the method that RESPONDER uses for exchanging knowledge and fostering mutual understanding – participatory systems mapping. After a brief introduction to the method by *Michal Sedlacko* (RIMAS, Vienna University of Economics and Business), participants will be divided into three thematic working groups, and jointly elaborate and debate system maps from the perspective of opportunities for job creation, research objectives and policy instruments and measures. System mapping exercises will be facilitated by *Frieder Rubik* (IÖW, Germany), *Michal Sedlacko* (RIMAS, Vienna University of Economics and Business) and *Nuno Videira* (CENSE FFCT-UNL).

In the concluding part of the day, all participants will get the opportunity for a **poster walk**. Firstly, we will hear **five short presentations** of projects on distinct issues dealing with sustainable food, and then participants will be invited to discuss them in front of the posters developed by the presenters. The poster walk will provide a ‘food for thought marketplace’ – an informal opportunity for face-to-face discussions, debates and reflection.

As the final point on the agenda on Day 1, a dinner will be hosted at Can the Can Restaurant.

On **Friday, 19 April**, following a brief presentation of the interim outcomes from the first day of the event, Session 4 “Improving Understanding on Food Waste” is the next point on the agenda. *Andrew Parry* (Consumer Food Waste Prevention Programme Manager, WRAP, United Kingdom) will provide his perspective on what can be learned to achieve broader sustainability goals from experiences in tackling food waste in the UK. Following a brief period for questions and discussion, a second session on participatory systems mapping will take place, focusing on exploring the issue of food waste in households.

The final session, “Towards sustainable food system: challenges and opportunities ahead” will start with a keynote presentation from *Alexandre Meybeck* (Senior Policy Officer at FAO – Food and Agriculture Organisation of the United Nations, Italy) addressing issues of governance for sustainability in global food systems. The final plenary discussion will connect the dots on the key topics discussed throughout the event, bringing together the different parts and information discussed, and a synthesis of key messages. *Frieder Rubik*, will wrap-up the debate and give an outlook of upcoming events and activities planned in the RESPONDER project.

The workshop will provide plenty of opportunities for informal discussions and social interaction.

6.2 Systems mapping sessions

As already mentioned, RESPONDER aims to improve mutual understanding and knowledge exchange between policy and science by using participatory systems mapping as a core methodology. ‘System maps’ serve as the basis for systematising the links and contradictions between sustainable consumption and economic growth in various consumption domains. The systems mapping sessions at the knowledge brokerage event on “Shaping the Future of Sustainable Food Consumption” will focus on the two key topics “Sustainability issues in the Food Chain” and “Food waste in households”.

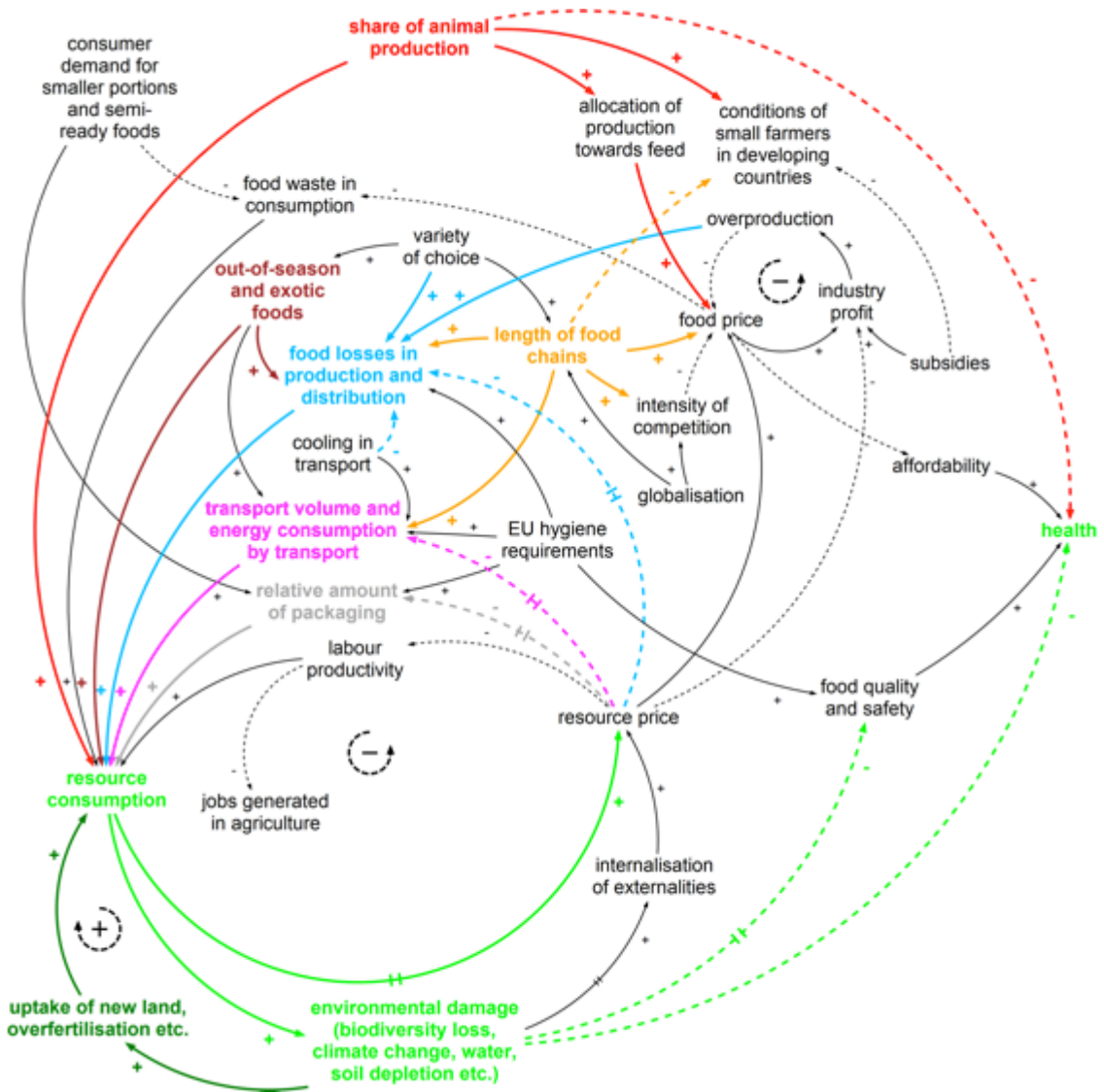
6.2.1 System map on Sustainability Issues in the Food Chain

This system map (Figure 4) explores the questions “What are the underlying causes of unsustainability of the food chain? How to promote sustainability in the food chain?”. The main storyline of the map is that **resource prices** could – with full internalisation of external environmental costs and without time delays and other distortions – fulfil a balancing and regulating function for **natural resource consumption** by stimulate **resource efficiency** in the food chain, as well as lead to positive **job effects**. As is visible in the map, the actual level of consumption of natural resources is conceptually the result of a number of drivers. A high level of natural resource consumption leads to a fast depletion of resource stocks, resulting (with some time delay) in rising resource prices, as well as to environmental damage. **Environmental damage** (as soil depletion, biodiversity loss, climate change, eutrophication etc.) over time affects food quality and food safety as well as **health**. It also initiates a reinforcing spiral when due to environmental damage even more resources need to be consumed: for example as uptake of new land and deforestation or increasing use of fertilisers.

Another storyline revolves around **animal production**. A high share of animal production and consumption has a range of negative effects; nevertheless, it could improve the livelihoods of small farmers in developing countries that live on lands not useful for plant production but which could support livestock. Yet another storyline revolves around **length of food chains**. Shorter food chains would be bene-

ficial from the perspective of natural resource consumption as well as conditions for small farmers, yet the impacts on food prices and jobs are not easily predicted.

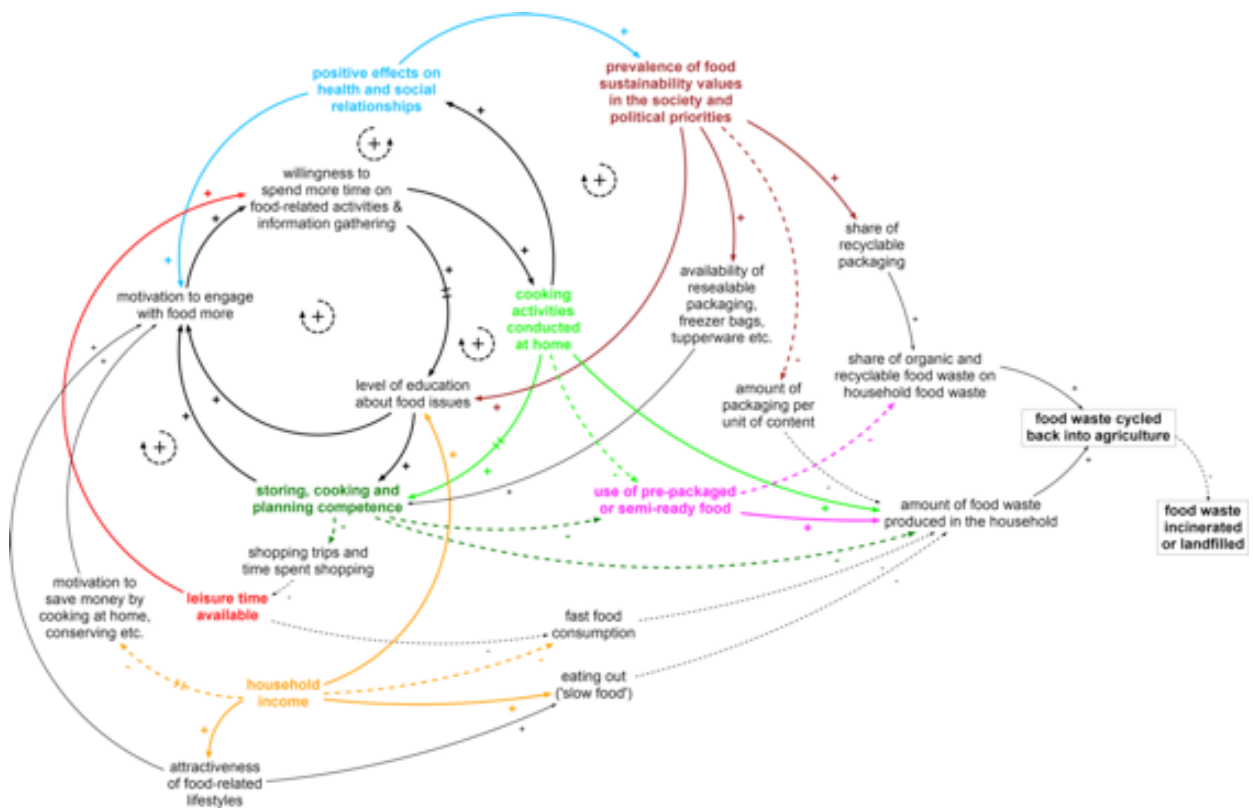
Figure 4: System map on Sustainability Issues in the Food Chain



6.2.2 System map on Food Waste in Households

This system map (Figure 5) was prepared for the 2nd sustainable food consumption MKB event in Lisbon. The map was developed by the participants of the 1st sustainable food consumption MKB event when pursuing the question “Could healthier and more sustainable diets lead to increased food waste in European households?” and attempting to shed light on the linkages between **food consumption habits** and the **emergence of food waste**. The map was then updated with input from external experts. This version of the map does not contain the inputs from the second event contributed by the participants yet; i.e. it is a version from before the event.

Figure 5: System map on Food Waste in Households



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