



EU policy review for food waste prevention and valorisation

D3.3 Screening of EU policy areas with relevant impact on food waste prevention and valorisation



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List of abbreviations

ABP	Animal by-product
AD	Anaerobic Digestion
APHA	Animal and Plant Health Agency
CA	Consortium Agreement
CAP	Common Agricultural Policy
CC	Consortium Committee
CE	Circular Economy
CFP	Common Fisheries Policy
DG	Directorate-General
DG Mare	Directorate-General for Maritime Affairs and Fisheries
DG Sante	Directorate-General for Health and Food Safety
DOA	Description of Action
EAFRD	European Agricultural Fund for Rural Development
EC	European Commission
ECA	European Court of Auditors
EEA	European Environment Agency
EEB	European Environmental Bureau
EESC	European Economic and Social Committee
EFF	European Fisheries Fund
EFFPA	European Former Foodstuffs Processors Association
EFTA	European Free Trade Association
EIB	European Investment Bank
EIP	European Innovation Partnership
EMAA	<i>Énergie Méthanisation Autonomie Azote</i> i.e. Energy Anaerobic Digestion Autonomy Nitrogen
EMFF	European Maritime and Fisheries Fund

EP	European Parliament
EU	European Union
EU FIC Regulation	European Food Information to Consumers Regulation
FEAD	Fund for European Aid to the Most Deprived
FeBO	Feed Business Operators
FAO	Food and Agriculture Administration of the United Nations
FF	Former Foodstuff
FLFW Platform	EU Platform on Food Losses and Food Waste
FUSIONS	Food Use for Social Innovation by Optimising Waste Prevention Strategies
GA	Grant Agreement
GCA	Grocery Code Adjudicator Act
GHG	Green House Gas
GSCOP	Groceries Supply Code of Practice
HACCP	Hazard Analysis and Critical Control Points
ICT	Internet and communication technology
IPES Food	International Panel of Experts on Sustainable Food Systems
LO	Landing Obligation
MFF	Multi-annual Financial Framework
MLOR	Minimum Life on Receipt
MS	Member states
MSY	Maximum Sustainable Yield
NGO	Nongovernmental organization
NWPP	National Waste Prevention Programmes
PAYT	Pay-as-you-throw
PCG	Project Coordination Group

PO	Project Office
REFRESH	Resource Efficient Food and dRink for the Entire Supply cHain
SCI	Supply Chain Initiative
SDG	Sustainable Development Goal
SME	Small and medium sized enterprise(s)
SPBTT	Science-Policy-Business Think Tank
SSC	Scientific Steering Committee
STECF	EU Scientific, Technical and Economic Committee for Fisheries
STOA	Science and Technology Options Assessment
TACs	Total Allowable Catches
TFEU	Treaty on the Functioning of the European Union
TSE	Transmissible Spongiform Encephalopathy
UTP	Unfair Trading Practices
WEEE	Waste electrical and electronic equipment
WFD	Waste Framework Directive
WP	Work Package
WRAP	Waste and Resources Action Programme

1 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 EU's 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

¹ food waste measurement methodologies, food donation guidelines, guidelines for the better use of former foodstuffs as feed and better use of date marking

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 address 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.

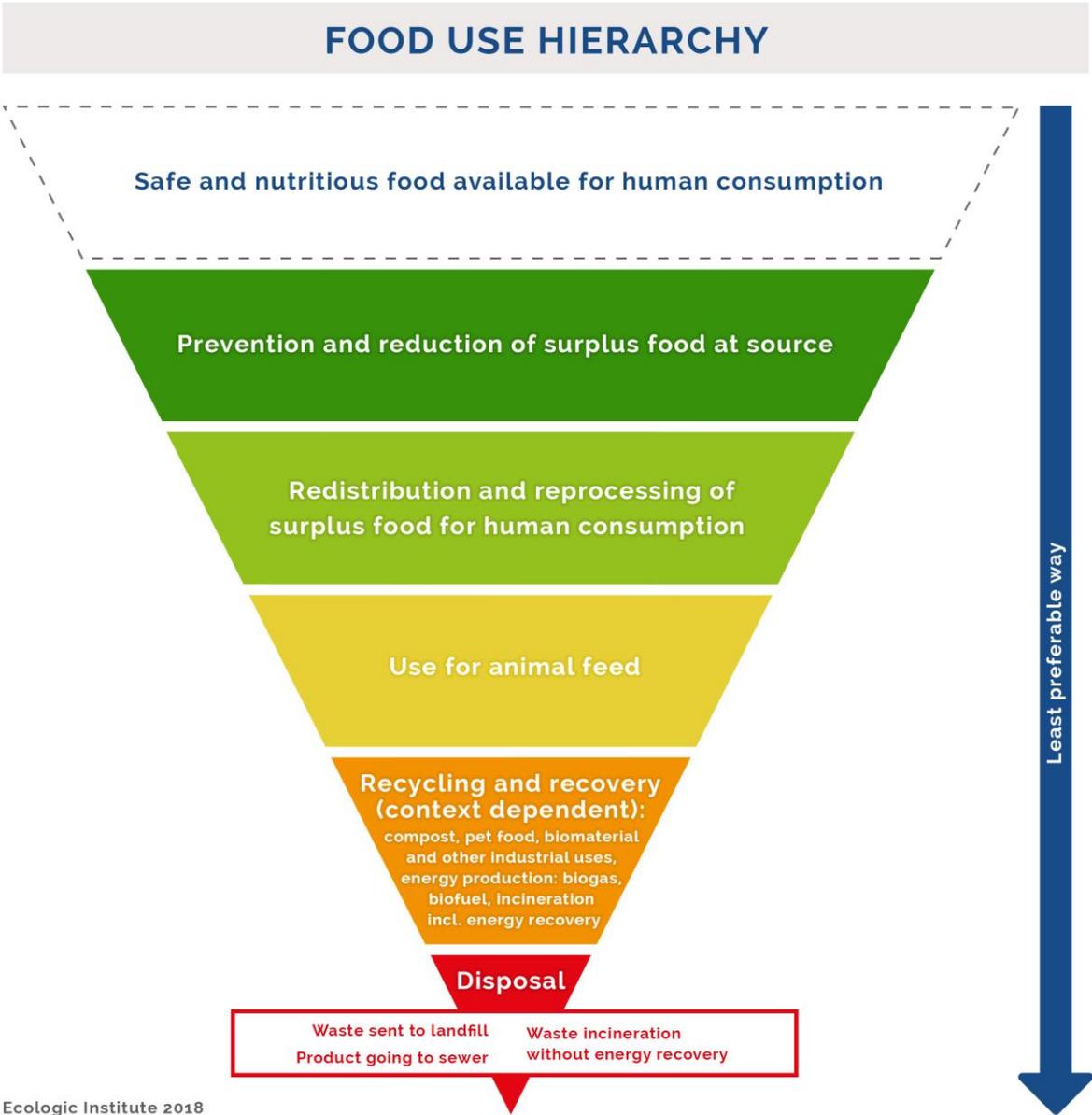
- Changing consumer behaviour: Policy makers have options to affect consumer behaviour through instruments such as public campaigns and through contextual settings. These can be used to influence consumers' motivation, their skills and knowledge, as well as opportunities available to them, which are 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.

Figure 1: Food use hierarchy



2 Introduction and objectives

Reducing and preventing food waste is increasingly recognized as an impactful and important way to reduce the environmental footprint of the food system and to achieve a sustainable, resilient food system, contributing to global food and nutrition security.

It is still a comparatively new policy area, particularly since the scope of the problem has long been neglected. It is only since approximately 2010² that first steps have been taken on EU and international level to address the reduction of food waste. This was also the time where first calculations of the scope of the problem became available. While there are still no fully comparable definitions and assessments of food losses and waste internationally, all studies show the large dimension of the problem: The FAO estimates that each year, approximately one-third, by mass, of all food produced for human consumption in the world is lost or wasted (FAO 2011). For the EU, the research project FUSIONS has estimated that 88 million tonnes of food are wasted each year, equating to 173 kg of wasted food per person. The costs associated with this level of food waste are estimated to amount to around 143 billion EUR (FUSIONS 2016). Besides high social and economic costs, food losses and food waste contribute to climate change with a global carbon footprint of about 8 % of total anthropogenic global greenhouse gas (GHG) emissions (FAO 2015a), and represent a waste of scarce resources such as land, energy and water.

However, even with a better understanding of food waste, addressing the problem remains very complex, as the drivers behind food waste are different within each of the steps of the supply chain (farmers, retailers, households etc.). They also vary between countries and product categories. Understanding the drivers is therefore an important first step to tackle the problem. Publications e.g. within FUSIONS (FUSIONS 2014) and the more recently developed system maps of food waste drivers for different products along the value chain within the REFRESH project (Burgos et al. 2017) provide important insights on those relevant drivers.

These analyses showed that “legislation and policies” is one of the four important driver categories³. Beyond policies as drivers for food waste they can of course also act as a supporting framework to reduce food waste. The range of policies with an impact is however large and ranges from food safety and hygiene policies (e.g. donation of food, animal feed) to agricultural (e.g. post-harvest losses) and fisheries policies (e.g. discards) to financial policies (tax reductions) and energy policy (e.g. incentives for anaerobic digestion/biogas facilities) – among many others.

Food waste policies therefore need to be well coordinated to take into account the different links of sector policies. In this context, “a strengthened and better coordinated EU strategy” to combat food waste and a recommendation to “better

² E.g. In 2010 the study “Preparatory Study On Food Waste Across EU 27” (BIO IS 2010), which sparked action in the European Commission. See also chapter 4 .

³ With the other three being: (1) technological; (2) institutional factors with regard to business and economy, and (3) Social (consumer behaviours and lifestyles) (FUSIONS 2014)

align the different EU policies which can combat food waste” has recently been demanded by the EU court of Auditors report “Combating Food Waste: an opportunity for the EU to improve the resource-efficiency of the food supply chain” (ECA 2016).

The improvement of EU policies to reduce food waste is also an objective of the EU H2020 funded research project REFRESH. Together with stakeholders from policy, research, civil society and business, the REFRESH project will therefore develop EU policy recommendations. This report is a first step towards this objective as it provides an overview of the most relevant EU policies and their potential impacts to reduce food waste, illustrates the various links between different policy areas and provides possible entry point for changes in EU policies.

An earlier version of the report was discussed in an expert workshop in Brussels on November 9, 2017⁴. Policy recommendations will be drafted until early 2019 and concentrate on four areas, that are in the focus of the REFRESH research activities. These are:

1. Opportunities to reduce food losses and food waste through voluntary agreements (policy brief and workshop with Member States representatives planned for on June 19 in Amsterdam)
2. Policy options to influence consumer behavior, particularly public campaigns (Policy brief and workshop in autumn 2018)
3. Policy brief and seminar on animal feed
4. Policy brief on unfair trading practices

There will also be a separate policy brief⁵ with overall policy recommendations to reduce food losses and waste in the EU and a workshop to discuss the overall conclusions around February 2019.

⁴ The summary of the workshop is available online (REFRESH 2017b). The summary also contains participants feedback on priority areas for political actions. In the follow up of the workshop and feedback received by participants and EU Commission staff (see above for acknowledgements) some updates have been made to the report, dated October 2017. However, not all policy developments that took place until April 2018 have been incorporated, but will be considered in the development of the policy briefs and policy recommendations.

⁵ The recommendations will differentiate at what level (EU/national) interventions need to be made.

3 Methodological approach and scope

To identify the most relevant EU policies to reduce food waste, this work **builds on existing literature**. This includes an update of the FUSIONS Review of EU legislation and policies with implications on food waste (Vittuari et al. 2015), the report of the European Court of Auditors (ECA 2016) that reviewed the effectiveness of EU policies including the replies of the EU Commission, the 2013 STOA report (Priefer, Jörissen, and Bräutigam 2013) about potential EU policy actions, and other relevant literature (accompanied by interviews). The policy screening goes beyond the analysis of the available publications as it

- a) considers the very dynamic development of EU policies that have taken place in the last years and
- b) covers not only food loss and waste policies with regard to *prevention* (as in e.g. the ECA report) but also looks into the *valorisation* of food waste, that also play a big role in the overall REFRESH research project.

The report provides the basis for the subsequent tasks within the REFRESH project's policy work, as it provides a short but broad overview of relevant EU policies. A more detailed analysis and the actual development of policy recommendations (which are not yet part of this report) will be conducted for four selected policy areas until early 2019 (see chapter 1 and 2).

3.1 Selection criteria for policy areas

While the report intends to provide an overview of EU policies it can however not be exhaustive. We therefore cover some policies to a less extend than others. The following criteria played a role in selecting policy areas for this screening:

- Selection of policies that can cover large food waste volumes (prevention and valorisation) and have a large environmental impact⁶
- Focus on policies that support REFRESH's key activities and targets: valorisation of food waste (particularly former foodstuff to animal feed), building of voluntary alliances between business and policy actors and behaviour change of consumers.
- Special consideration of EU policy areas that are currently under review and can potentially be influenced through the REFRESH policy work (without duplicating work that is undertaken elsewhere such as in the case of food donation, where guidelines are currently under development and scheduled to be finalized until the end of 2018⁷).

⁶ Which was also a selection criteria for the identification of the top 20 food waste streams within the REFRESH project (Moates et al. 2016) and a basis for the selection of products for the food waste driver system maps within REFRESH (Burgos et al. 2017, in press).

⁷ Shungham EU Issue Tracker (2018): Food Donation: Commission Updates Member State Experts on Progress of Food Donation Subgroup's Work, 26 March 2018

3.2 Policies outside of the scope of this report

There are two bigger exemptions of relevant food waste policies currently dealt with on EU level, where **REFRESH will not provide analysis and recommendations** for in its policy work: **Monitoring and measuring of food waste** (a key element of the FUSIONS project) and the **legislative framework for donations/redistribution incl. role of VAT**. This is due to the fact that there a) already is a substantial amount of (research and policy) work available and b) because it is not in the scope of the overall REFRESH project. The relevance of these policies will however be briefly summarized below and mentioned in chapter 4 as far as this information is relevant for the understanding of policy developments in other areas.

- **Donation:** The primary focus of food waste reduction should be on prevention. However, surplus that still occurs should still be used for human consumption. Redistribution of food surplus is a growing phenomenon and food manufacturers and many retailers are willing to donate their surplus to food. However, Member States and stakeholders have identified legal and operational barriers, for donors and receivers, to the redistribution of food in the EU. The Circular Economy Action Plan therefore required of the European Commission to clarify EU legislation related to food in order to facilitate food donation. On October 16, 2017 the Commission Notice on EU food donation guidelines was published. The Notice aims to promote the common understanding of EU rules applying to the redistribution of surplus food by regulatory authorities in the EU Member States, also clarifying perceived tax barriers of e.g. implementation of the VAT directive that have prevented the donation of food to food banks in the past. They also clarify EU legislation that has impacts on food donation (e.g. food safety, traceability, legal liability) in order to help food donors, food banks, and other charity organisations comply with the legislation⁸. The guidelines seek to complement but not duplicate national guidance on food donation and can be used as a reference by the relevant actors in the field of food donation. The scope of the Commission's measure covers providers and recipients of surplus food⁹ (EU Commission 2017)¹⁰.
- **Monitoring and measuring of food waste:** A common EU methodology to measure food waste consistently is a precondition to track progress but also to identify remaining challenges where food waste still occurs. However, while there are already approaches developed by the WRI "Food Loss and Waste Protocol" (Food Loss + Waste Protocol 2016) and the FUSIONS project outcomes on a common methodology (see chapter 4.2) there is still no common agreed methodology.

⁸ The Commission intends to begin a pilot project on food redistribution to examine redistribution practices and barriers across MS, as well as support dissemination of the Guidelines (Gassin 2017).

⁹ namely food business operators which are provided with food by the holder (food banks) free of charge.

¹⁰ The European Parliament and the Council might decide to formally respond to the Notice with a Resolution and Conclusions, respectively (Shungham EU Issue Tracker 2017).

There are more policy areas that have some relevance but are not dealt with in detail in this study, but should be part of further research activities. Among them are:

- **Bioeconomy strategies:** The bioeconomy aims to replace products that are currently based on fossil resources with renewable biological resources from land and sea – such as crops, forests, fish, animals and micro-organisms – to produce food, materials and energy. There is potential for food waste to serve as an efficient input material in the bioeconomy.¹¹ While the benefits of bioeconomy strategies can be large and help to fulfill climate policy targets, the increased demand for renewable resources may divert biobased materials from preferable use options, such as food or animal feed. Strong policies to reduce the overall consumption of renewable resources are therefore needed as well as an implementation of the food use hierarchy as a principle in policy (see chapter 4.2).
- **Novel Foods:** In the 'Novel Foods Regulation' (Regulation (EC) No 258/97) Novel food is defined as food that has not been consumed to any significant degree in the EU before May 1997. Novel Food can be e.g. produced using new technologies or be food traditionally eaten outside of the EU. Novel foods are subject to a pre-market safety assessment before a decision is made on EU-wide authorisation. There is no research about the impact of non-authorisation of novel foods or long approval procedures on food waste. However, a relation is possible for e.g. using by-products or new technologies. In November 2016 a new novel food regulation has been agreed. The new Regulation aims to increase the efficiency of the authorisation procedure, to remove unnecessary barriers to trade, whilst ensuring a high level of food safety (European Commission 2015c).
- **Supporting social innovation:** Many of the solutions to tackle food waste have first been developed by social entrepreneurs and civil society initiatives. A supporting policy framework, like the provision of specific socio-economic incentives is needed to help these actors maintaining their activities. The FUSIONS project has provided policy recommendations how to achieve this (Vittuari et al. 2016).

3.3 Structure of the policy analysis

For each identified relevant policy area the review will include the following two sections:

- **Overview:** A description of the policy areas, main regulations and general mechanisms in relation to food waste prevention, reduction and valorisation (i.e. naming the most relevant regulations and connection to food waste – considering prevention, reduction and reuse/valorisation). Provision of the

¹¹ E.g. REFRESH is conducting research developing novel food products and chemical products from food processing side streams and from unavoidable food waste (WP6). Results will be published by 2019 on the REFRESH website: <http://eu-refresh.org/results>

current status (e.g. due for revision, changes discussed in certain areas relevant for food waste reduction etc.).

- **Impacts and opportunities for improvement:** This section will contain a qualitative description of the known impact dimensions of the policy in relation to food waste, with the following aspects as guiding questions:
 - What are the direct impacts of the EU policy on food waste?
 - What have been (or are expected to be) the longer-term and indirect impacts on food waste?
 - What are the uncertainties in the assessment of impacts?

With these guiding questions the screening builds on the methodology developed and used by the EEA in their report “The direct and indirect impacts of EU policies on land” (EEA 2016). As there is in most policy areas no or only very little data about impacts (quantitative as well as qualitative) available, this section will mainly describe the *mechanism* how policy requirements contribute to food waste. Assumptions will be made transparent.

This section will also describe potential (windows of) opportunities to improve the policy and (if applicable) how MS can use their leeway in implementing EU regulations and directives. Different to the policy recommendations that will be developed later within the project, this section focuses on the question where there can be potential entry points for future changes (e.g. through the change of standards, financial support etc.) but not yet how they can be designed in detail and which processes would be needed to implement changes.

4 Overview of EU policies with relevance to food waste

In this section we will briefly outline the evolution and status quo of EU policy action directly targeting food waste. We first introduce sectoral policies at the EU level that have an influence on food waste, which we then investigate in detail in the following chapter.

4.1 EU policies on food waste

The first major milestone introducing food waste explicitly as an EU policy issue was the adoption of the **2011 Roadmap to a Resource Efficient Europe** (COM (2011) 571 final) published in 2011. The Roadmap was part of the implementation of the Resource Efficiency Flagship of the Europe 2020 Strategy, adopted in 2010 Policy review. The Roadmap established the Milestone that by 2020, disposal of edible food waste should be halved in the EU, and invited MS to address food waste in their National Waste Prevention Programmes¹². It also established that the Commission will “further assess how best to limit waste throughout the food supply chain, and consider ways to lower the environmental impact of food production and consumption patterns” through a Communication on Sustainable Food by 2013.

In 2013 a consultation on this Communication on Sustainable Food was carried out. It received over 600 responses (European Commission 2013). The Communication was prepared based on the consultation, and the text was technically ready to be presented in 2014. However, the Communication was never presented. Although no official reason was given for the shelving of the Communication, it was likely due to a shift in political priorities with the change in Commission. When the new Commission took office in November 2014, the new College of Commissioners decided not to approve the adoption of the Communication (Shungham EU Issue Tracker 2015). The lack of follow-up has been criticised by stakeholder groups and by the ECA (see e.g. ECA 2016; Friends of the Earth Europe, Compassion in World Farming, and Slow Food 2014).

In 2012, the European Parliament adopted a **resolution on how to avoid food wastage**, which recommended that the European Commission take practical measures towards halving food waste by 2025 and asked Member States to develop national food waste prevention programmes (European Parliament 2012).

In 2013 the 7th Environmental Action Programme (7th EAP) to 2020 “Living well, within the limits of our planet” was published (European Parliament 2013). It made clear reference to food waste, demanding an EU strategy against food waste, more cooperation with Member States, and measures to increase use of food waste in composting and AD (Article 37)¹³, a review of existing legislation and the set up of public campaigns (Article 43). Finally it generally requires to improve

¹² For more on National Waste Prevention Programmes in the WFD, see chapter 0

¹³ “The Commission should present a comprehensive strategy to combat unnecessary food waste and work with Member States in the fight against excessive food waste generation. Measures to increase composting and anaerobic digestion of discarded food, as appropriate, would be helpful in this regard.”

environmental integration and policy coherence, as later also demanded by the European Court of Auditors in 2016 (Article 89).

In **2014 the European Commission put forward an initial circular economy package**. The package contained four legislative proposals and an action plan for the circular economy, entitled **“Towards a circular economy: A zero waste programme for Europe”** (COM 2014/0398). The legislative proposal on waste and the action plan included a food waste target of at least 30 % reduction by 2025 and a definition of “food waste” as part of the proposed Waste Framework Directive. However, in March 2015 the Commission withdrew the legislative proposal on waste included in that package and replaced the Action Plan from the previous Barroso II Commission¹⁴. The new Circular Economy Package was presented in December 2015. The **2015 Action Plan is entitled “Closing the loop”** (European Commission 2014c). It identifies food waste as a priority area for action and reconfirms the EU’s commitment to food waste reduction – this time referring to the meanwhile adopted food waste goals laid down in the global 2030 Sustainable Development Goals (SDG) (see chapter 4.2).

In **2015** also other actors raised their voice to demand actions against food waste: , such as the **European Committee of the Regions** with its **“Resolution on Sustainable Food”**, that requested the European Commission to promote reduction of food waste and to re-table a proposal for a food waste reduction objective of at least 30 % by 2025 (based on its withdrawn proposal from 2014 amending the Waste Framework Directive).

The European Parliament adopted a **second own-initiative Resolution “Resource efficiency: reducing food waste, improving food safety”** on **May 16th 2017**. Several of the opinions and actions in the 2017 resolution echo similar statements in the 2012 resolution, such as the request to develop a harmonized definition of food waste and implement food waste targets. The 2017 resolution calls for better coordination between the EU and MS and to strengthen and better align the EU effort to reduce food waste. It also “calls on the Member States to take the measures required to achieve a Union food waste reduction target of 30 % by 2025 and 50 % by 2030 compared to the 2014 baseline” (Paragraph 12), and asks the Commission to examine the possibility of setting binding EU-wide food waste reduction targets to 2025 and 2030 (Paragraph 13). It further supports:

- the adoption of a common methodology for food waste measurement (Paragraph 14) and definition of food waste (Paragraph 15)
- application of the food waste hierarchy in the Waste Framework Directive (WFD) (Paragraph 22),
- improvements in date marking (Paragraph 47),
- consumer awareness raising campaigns at EU and MS level (Paragraph 54),

¹⁴ The 2014 changes to the Commission also brought a shift in responsibility for the topic of food waste within the Commission from DG Environment to DG Health and Food Safety (DG Sante).

- and changes to the VAT directive to facilitate food donation (Paragraph 86).

Beyond this, it also calls on actors in the food supply chain to implement the voluntary Joint Food Wastage Declaration 'Every Crumb Counts' and the 'Retail agreement on waste' (Paragraph 111) and other voluntary codes of good practice in the food supply chain (Paragraph 127).

In June **2016, the European Council** positioned itself on food waste in its Conclusions of 2016 "Food losses and food waste" of 28 June 2016 (10730/16) (Council of the European Union 2016). These Council conclusions develop in more detail the Council conclusions on the EU action plan for the circular economy (20 June 2016).

The Conclusions call on MS to i.a.:

- confirm their commitment to SDG 12.3
- welcome the outcomes of the FUSIONS project e.g. on food waste measurement
- encourage the implementation of the food waste hierarchy
- support awareness raising among the population
- put food waste on food chain actors' agendas, promote cooperation, and obtain better data on food losses and waste across the food chain

The Council also calls on the Commission to i.a.:

- use the outcomes of FUSIONS and other research projects to develop a food waste definition and quantification protocol
- include concerns on reducing and valorizing food waste in future policy reviews
- improve date marking understanding and usage
- foster discussions with MS on strengthening management of the food supply chain and fostering cooperation between actors
- create guidelines on current legislation on waste, food and feed, to facilitate food donation and the use of former foodstuffs and by-products in feed production

Furthermore, EU-funded **research projects, such as FUSIONS** (Food Use for Social Innovation by Optimising Waste Prevention Strategies, 2012-2016) have had an impact, e.g. by developing a definition and measurement proposal for food waste.

In its **2016** evaluation of the EU's role in food waste "Combating Food Waste: an opportunity for the EU to improve the resource-efficiency of the food supply chain", the **European Court of Auditors concluded that the EU was not yet effectively combating food waste** (ECA 2016). The report looked only at the actions of prevention and donation, as these are highest up the food waste hierarchy. In this regard, the scope of the ECA report is narrower than the scope

of this report and of the REFRESH project, which also takes valorisation and use for feed into account. Three main criticisms arose from the report:

- The Commission's level of ambition on food waste has decreased over time, e.g. as evidenced by changes to language and goals in policy documents between versions.
- Assessments of the impact of EU policies on food waste are lacking.
- There is potential to improve how barriers to the donation of food waste are addressed.

4.1.1 Policies and initiatives at the international level relevant to EU food waste policy

EU policies also profit from other policies and activities on the **international level** that aim to mobilize action against food waste. The **SDG target 12.3. on food waste reduction** is an important international reference and part of the 2030 agenda "Transforming Our World: the 2030 Agenda for Sustainable Development", which is composed of 17 goals and 169 targets, also known as "Global Goals". It was adopted in September 2015 by the 193-Member United Nations General Assembly. Target 12.3 aims to "halve per capita food waste at the retail and consumer levels, and reduce food losses along production and supply chains by 2030". Focussing on retail and consumer level, this specification of target 12.3 therefore does not include food waste and losses at primary production level. However, the SDG targets in the 2030 Agenda are defined as "aspirational and global", with each government tailoring its own national targets and indicators "guided by the global level of ambition but taking into account national circumstances". This also leaves room for a broader implementation of the food waste target. Also, as of October 2017 there is not yet an internationally agreed indicator to measure this target. On the EU level, there is so far no coherent strategy yet to implement the SDGs.

Among the most important international initiatives on food waste is the **Champions 12.3 initiative** that was founded in January 2016. It is a coalition of executives from governments, businesses, international organizations, research institutions, farmer groups, and civil society that strive to accelerate progress toward achieving SDG Target 12.3 by 2030.

Also, the G20 agriculture ministers meeting held in Turkey in May 2015 identified the extent of food loss and waste as a large global problem. It was followed by the establishment of the Meeting of Agricultural Chief Scientists of G20 (**MACS-G20 Food Loss and Waste Initiative in 2015**), with Germany taking over the leadership for further joint activities. A first step was the establishment of a web portal with information about current research activities, latest innovations and available scientific expertise¹⁵. Ongoing activities will enhance further cooperation between G20 members related to information and knowledge sharing and joint research and implementation actions among others (TI 2018).

¹⁵ www.global-flw-research.org

4.1.2 National food waste frontrunners within the EU

In parallel, **national initiatives** for food waste reduction have further sparked action and public debate.

In the **UK the "Courtauld Commitment"** has contributed significantly to the debate. It is a voluntary agreement that brings together organisations across the food system to make food and drink production and consumption more sustainable. It started in 2005 and went through several phases. By signing up to the initiative, companies agree to take action that contributes towards the commitment's overall targets to reduce packaging and food supply chain waste. They also agree to report annually to WRAP on their progress.

In **2015 French policy makers released policy proposals** against food waste. Among the agreed legislative measures is a ban on the disposal of unsold foods by supermarkets and requirement that supermarkets instead donate the products to charities and food banks.

In **2016 Italy followed with the so called "Gadda Law"**. It took a different approach by encouraging donations through a set of adapted requirements, e.g. for mandatory declaration of donations¹⁶ and simplification of regulation with regard to donations and a clarification about the products that can be donated and about operators which regularly distribute food. It also established a definition of food surpluses, food waste and a hierarchy for the use of food surpluses. It recognised the importance for an integrated approach to tackle food within the food chain, established actions to increase the awareness of consumers and set up a fund for anti-food waste and recovery projects.

4.1.3 Recent activities by the European Commission on food waste

The most **recent activities on food waste of the EU Commission** are mainly built around four issues (European Commission 2017c):

- **further development of food waste measurement methodologies** (see chapter 3.2).
- **EU food donation:** On October 25, 2017 the EU Commission published the notice "EU guidelines on food donation" (2017/C 361/01). Additionally, the EU food donation subgroup of the EU platform on Food Waste currently works on the preparation of a document illustrating Member States' practices on food donation. The final document is scheduled to be published by end of 2018¹⁷.

¹⁶ Before this national law there was the previous Law (called "La legge del buon samaritano" or "Law of the Good Samaritan", Law n. 155/2003) which put the charities collecting the food (and not the food donors) in the situation to be responsible of the correct storage of the donated food and they were responsible of the expiration date (STREFOWA 2018).

¹⁷ Information according to Shungham EU issue tracker 2017: "Food Donation: Commission Updates Member State Experts on Progress of Food Donation Subgroup's Work", November 13, 2017

- **Safe use of food resources:** Guidelines on the **use of former foodstuffs as feed** (see chapter 4.4).
- Examination of a **better use of date marking** (see chapter 4.9).

As a cross cutting action, in 2016 the EU Commission established the EU multi-stakeholder **Platform on Food Losses and Food Waste** to assist in priority setting, sharing of best practices, and facilitating inter-sector cooperation. The Platform aims to provide expert advice on horizontal issues (e.g. opportunities for food waste prevention across the supply chain); implementation of EU policy, legislation, and programmes related to food waste; and facilitating preparation of policy initiatives where relevant (European Commission 2017f).

Currently the platform comprises 70 members, covering public entities (EU bodies, Member States/EFTA countries, international organisations), trade and business organisations, NGOs, not-for-profit social enterprises, professional associations, and academia and research institutes.¹⁸ The Platform meets biannually, and the topics covered by the work of the Platform reflect the Commission's priority areas for action on food waste. Specific working groups on food donation and food waste measurement – and since July 2017 - a subgroup to support EU activities on "action and implementation" are part of the Platform. A sub-group dedicated to the issue of date marking will be established in 2018.

4.2 EU Waste policy and the Circular Economy

4.2.1 Overview

Until relatively recently, EU Waste Policy neither explicitly addressed bio-waste, nor food waste. However, in the context of the recent shifts in EU waste policy to foster resource conservation and the circular economy, the issue of food waste also received much stronger political attention.

EU Waste Policy and the Circular Economy are conceptually interlinked, which policy strategies of the last years increasingly reflect. However, they have started out from different viewpoints and as rather separate issues at different times, developing from a waste policy to a resource efficiency policy to a circular economy policy framework.

EU Waste policy dates back as far as 1975, when in response to waste management problems on national level, which emerged in the 1960ies and early 1970ies, the Directive 75/442/EEC on waste was adopted. This early EU waste policy focused on **reducing the generation of waste and of its harmfulness** to both the environment and human health. It aimed at achieving this through a hierarchical order of activities (the so-called 'waste hierarchy'):

1. Preventing or reducing waste production and its harmfulness (e.g. through technology and product design that helps avoiding waste through greater

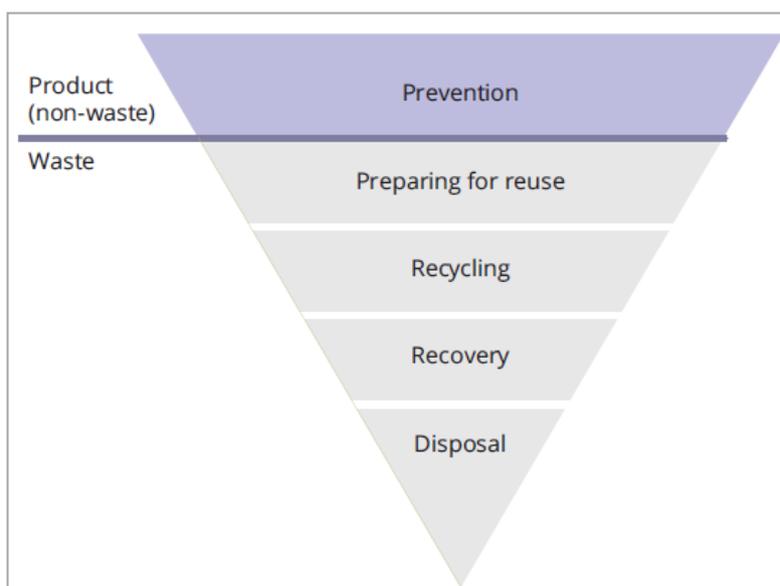
¹⁸ A list of members is available here: https://ec.europa.eu/food/safety/food_waste/eu_actions/eu-platform/platform-members_en

resource efficiency as well as reducing harmfulness of wastes and hence pollution hazards associated);

2. Recovering waste (by re-use, recycling or reclamation or any other process making use of secondary raw materials; or at the least, using waste as a source of energy thus reducing the use of primary energy carriers);
3. Disposing safely of waste containing harmful substances (e.g. developing appropriate techniques of storing such waste safely for the long-term).

In the course of revising the Waste Directive, the Waste Framework Directive 2008/98/EC from 2008 further refined the structure of the 'Waste hierarchy' by (see figure 2): enhancing the top priority of preventing waste in the first place; prioritising the re-use and preparation for re-use of a product over the material recycling of product parts and over their composting, while leaving the energy recovery from waste as the least favourite waste management option before the disposal of waste products in landfills (European Commission 2005).

Figure 2: Waste hierarchy



Source: (EEA 2015b, 9)

Processes and activities at all levels of the 'waste hierarchy' must be executed without endangering human health and the environment. However, in the 1990ies, evidence accumulated that waste management activities actually caused environmental problems, particularly in relation to pollution from landfills (European Commission 2005). As a key policy response, Directive 1999/31/EC on the landfill of waste was adopted in 1999, which sets standards and requirements as regards minimising the release of pollutants into the air or the groundwater from landfills (European Commission 2005).

One important environmental impact in this regard is the release of greenhouse gases (GHG), mainly methane from biodegradable waste (including food waste) being landfilled. While methane emissions fell between 1990 and 2008 from above 190 million tonnes to around 140 million tonnes, the disposal of solid waste still

accounts for more than ¾ of all GHG emissions related to waste (EEA 2011). Waste policy is viewed as one driver of GHG emission reductions achieved – for instance, the landfill directive lays down technical requirements and calls for Member State action to reduce the amount of biodegradable waste going to landfill (including the definition of deadlines for a stepwise reduction), which contributed to improved methane recovery and reduced methane emissions (EEA 2011).

EU waste policy not only achieved reductions in emissions related to waste management, but it also shifted waste management activities higher up on the waste hierarchy across the EU: based on most recent figures from Eurostat, the amount of waste landfilled declined from 144.7 million tonnes in 1995 to 62.1 million tonnes in 2015, while over the same time period the waste amounts recycled increased from 25 million tonnes to 69.6 million tonnes (Eurostat 2016).¹⁹

This indicates that through reducing waste generation and increasing recycling of waste (material as well as energy recovery when incinerated), waste policy is contributing to conserving the natural resource base and to providing secondary resources for business and industry.

In this regard, EU waste policy became very closely linked to the emerging EU resource policy and the Circular Economy. Focusing its 10-year strategy for economic growth and job creation until 2020 on smart, sustainable and inclusive growth (Europe 2020 Strategy, COM (2010) 2020 final), the European Commission put forward seven flagship initiatives to promote a more **resource efficient**, greener and more competitive economy. One of this flagship initiatives was the flagship initiative "A resource-efficient Europe" (European Commission 2011a) from 2011. It aims at fostering innovation towards resource efficiency in all economic sectors by increasing certainty for investments and innovation through setting up a long-term policy framework that ensures all relevant policies factor in resource efficiency (European Commission 2011a). Based on this flagship initiative, in September 2011 the European Commission then adopted the "Roadmap to a Resource Efficient Europe" (European Commission 2011b), which defines both resource efficiency and resource conservation objectives for the medium to long-term as well as measures towards achieving these objectives. Furthermore, the Roadmap explicitly clarifies that sustainable resource management needs to take a new and different approach towards waste: Transforming the economy into a resource-efficient path necessitates turning waste into resources as (secondary) raw materials.

In the context of waste becoming a resource, the concept of the "**circular economy**" has recently become widely known and was also subject of a separate policy strategy in the last years. The concept stands for moving from a linear economy, where raw materials are extracted, turned into products and then into waste (the so-called 'take-make-waste economy') to a logic of keeping flows of

¹⁹ Albeit with large regional differences: while in the Eastern European countries Bulgaria and Romania disposal accounted for more than 90 % of all waste treated in 2014, less than 20 % of waste was landfilled in Belgium, Czech Republic, Germany, Italy and Slovenia in 2014; the EU average was around 43 % in 2014 (Eurostat 2016). Material recycling made up more than 50 % of all waste treated in Belgium, Denmark, France, Italy, Latvia, Portugal and Slovenia in 2014, while it accounted for less than 10 % in Bulgaria, Greece, Romania and Sweden; the EU average stood at just below 40 % in 2014 (Eurostat 2016).

materials and goods in closed loops as much as possible, hence using waste as secondary resource input to the economic and societal system (Ellen MacArthur Foundation 2012; Rizos, Tuokko, and Behrens 2017). Beyond environmental benefits of material circulation (e.g. in terms of greenhouse gas emissions savings, air pollutant emissions savings and reduction of marine litter), moving to a circular economy also offers potential for positive economic and social impacts, such as cost savings for businesses, job creation and improvements in the security of supply of resources²⁰ (Ellen MacArthur Foundation 2012; Rizos, Tuokko, and Behrens 2017; European Commission 2014b, 2015a).

These multiple benefits prompted the European Commission to take action on the circular economy. Aiming to maintain “the value of products, materials and resources [...] in the economy for as long as possible, and [to minimise] the generation of waste [...],” in 2014 the European Commission put forward an initial circular economy package (CE package). The package contained four legislative proposals and an action plan for the circular economy, entitled “Towards a circular economy: A zero waste programme for Europe” (COM 2014/0398). The legislative proposal on waste and the action plan included a food waste target of at least 30 % reduction by 2025 and a definition of “food waste” as part of the proposed Waste Framework Directive. However, in 2015 the Commission withdrew the legislative proposal on waste included in that package and replaced the Action Plan from the previous Barroso II Commission. The new Circular Economy Package, reflecting the new Commission’s focus on growth and jobs, was presented in December 2015. The 2015 Action Plan is entitled “Closing the loop” (European Commission 2015b). It identifies food waste as a priority area for action and reconfirmed the EU’s commitment to the food waste reduction – this time referring to the meanwhile adopted food waste goals laid down in the global 2030 Sustainable Development Agenda, aiming to halve per capita food waste at the retail and consumer levels, and reducing food losses along production and supply chains by 2030 (target 12.3). Alongside the 2015 Action Plan, the new Circular Economy package of the Juncker Commission proposed amendments to several waste related directives: The WFD, the Packaging Waste Directive, the Landfill Directive, the end-of-life vehicles Directive, the Batteries Directive and the WEEE Directive. According to the first implementation report on the Circular Economy Action Plan (CE Action Plan)²¹, which the European Commission released in January 2017 (European Commission 2017g), an agreement on these proposals among Commission, Council and Parliament should be reached by the end of 2017. In May 2017, the so-called Circular Economy trilogue negotiations between the Commission, the Council and the Parliament commenced, aiming to come to a conclusion by the end of 2017 and thus preparing a common text becoming law (see Perchard 2017; Zero Waste Europe 2017). The European Parliament and the Council concluded a provisional agreement on the proposals in December 2017, and on 18 April 2018, the European Parliament endorsed the provisional agreement – which it expects to submit to the Council for approval in the first half of 2018 (European Parliament 2018a).

²⁰ Cost savings for the manufacturing sector at EU-level could be as high as \$630 billion annually; moving to a circular economy could lead to net job creation more than 50,000 new jobs by 2030 (see Rizos et al. 2016).

²¹ The implementation report gives a comprehensive overview of all actions already delivered in the implementation of the EU Action Plan since its adoption.

In the context of the political attention that food waste prevention received in recent years (see chapters 2 and 4), the European Commission proposes – as part of the CE package – to amend the WFD to also more explicitly address food waste.

Negotiations reviewing the Waste Framework Directive (WFD) are (as of early May 2018) **still ongoing**.

Since the publication of the amendments proposed by the Commission in December 2015 there is a strong debate ongoing between the Commission, the European Parliament²², the European Council and many non-governmental organisations (such as Friends of the Earth Europe or the EEB) as regards the level of ambition of the proposed amendments.

It is beyond the scope of this analysis to provide details for the different standpoints and arguments, but contention mainly revolves around

- Defining food waste with a wider or narrower scope;
- Installing a separate 'food waste hierarchy';
- Urging to consider food waste in waste prevention measures; and
- Developing a common methodology to measure food waste and define relevant indicators.

A survey that several NGOs²³ undertook across the EU-27 in spring 2017 revealed that Member States strongly differ in their will to support the European Parliament's proposals to boost EU waste policy²⁴.

4.2.2 Impacts and opportunities for improvement

There are a number of aspects and also instruments that have a likely impact on the prevention and reuse of food waste in the context of EU waste policy and the Circular Economy. Those that seem most promising are presented in this section. However, there are hardly any studies assessing potential impacts of changing these aspects in EU waste policy. Hence, where available, findings from impact assessments are used, whereas for the other aspects addressed below potentially positive impacts on the reduction of food waste are assumed.

²² The European Parliament came up with own proposals for amendments to the WFD and adopted these in its voting (first reading) from 14 March 2017 (European Parliament 2017a).

²³ Led by the European NGOs European Environmental Bureau (EEB), Friends of the Earth Europe and Zero Waste Europe.

²⁴ Several Member States, including countries usually perceived as frontrunners in environmental policy (such as Denmark and Sweden), seem to oppose some of the key proposals made by the European Parliament, such as mandatory separate collection of biowaste and/or a biowaste recycling target; and waste prevention targets (EEB 2017). Despite other countries leading on the support of key proposals by the European Parliament (Belgium, France, Greece, Romania, Spain, The Netherlands), the countries opposing the proposals appear to gain majority in the Council (EEB 2017).

Furthermore, as political debates on the actual changes to the WFD are currently ongoing, there appears to be little room for getting some of the below opportunities for improvement onto a political agenda in the near term.

Instating a separate food use hierarchy

The European Parliament proposes instating a separate waste hierarchy for food waste, which shall set priorities “[...] *in food waste prevention and management legislation and policy: (a) source prevention; (b) edible food rescue, prioritising human use over animal feed and the reprocessing into non-food products; (c) organic recycling; (d) energy recovery; (e) disposal.*” (European Parliament 2017a: Amendment 107).

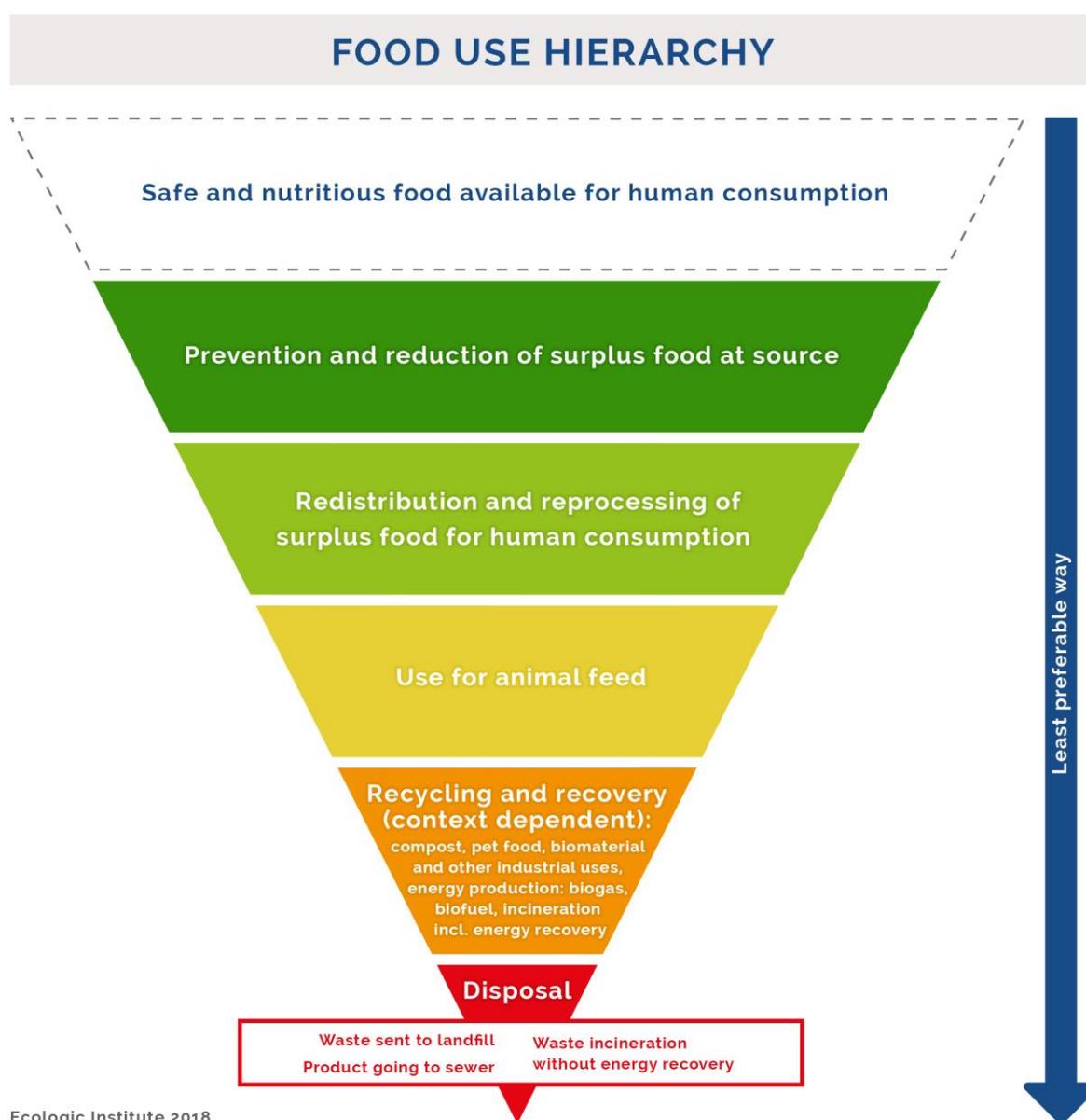
In its special report on “Combating Food Waste”, the European Court of Auditors also suggests modifying the WFD’s waste hierarchy “*to take account of the particularities of food*” (European Court of Auditors 2016, 10): for environmental and economic reasons prioritising actions to be taken before food becomes waste, in order to utilise edible food for longer and identifies the flowing steps in the hierarchy: “prevention, donation, animal feed, recycling, other recovery, disposal”.

In its reply the EU Commission “considers that the waste hierarchy defined in the waste framework directive fully applies to food waste” and hence does not consider it “necessary to lay down a specific food waste hierarchy in the EU waste legislation”. The provisional agreement on the proposal for a directive of the European Parliament and of the Council amending Directive 2008/98/EC on waste (European Parliament 2018c) no longer foresees a separate waste hierarchy for food waste. Current political processes seem to indicate that in the short-term there is only a very small window of opportunity to promote the idea of a food use hierarchy in European circular economy and resource conservation policy. In terms of forward-looking policy making, it makes though good sense to keep continuing to create political momentum for such a hierarchy in all policy fields that are relevant in terms of food waste.

However, even if the waste hierarchy according to the WFD applies to food waste, it does not tackle the particularities of food. As the objective of a food related hierarchy would be to keep food as long as possible in the food chain, **the hierarchy should rather be called “food use hierarchy”** (see figure 3 below). This hierarchy still uses the same categories as the waste hierarchy but is more specific. Adding a specific food use hierarchy would shift the focus on efforts preventing food waste and reusing food first for human consumption and secondly as animal feed, but still leave room for using material and thermal recovery.

This hierarchy can act as a guiding principle for food use and valorisation of food waste. Implementing such a food use hierarchy would benefit from improving separate collection of food waste (as part of bio-waste) and of stricter rules on landfilling biodegradable wastes.

Figure 3: Food use hierarchy



Fostering separate collection of food waste as part of bio-waste

While separate collection of food waste as part of bio-waste would rather implicitly help food waste prevention, it

1. is essential to exploit potentials for using food for animal feed as well as a precondition for high quality recycling (bipro and Copenhagen Resource Institute 2015) – in the case of food waste for nutrient recycling (composting) and energy recovery
2. could help incentivising food waste prevention via the use of Pay-as-you-throw (PAYT) schemes that reward waste reduction by costs to be paid, for instance, per volume or mass of waste generated.

As of November 2015, bio-waste is separately collected in only 13 Member States, while two Member States operate door-to-door collection for garden waste only and 12 Member States do not collect bio-waste separately at all (bipro and Copenhagen Resource Institute 2015). Door-to-door collection schemes seem to be most effective in terms of amounts collected per capita with 20 to 70 kg per capita, compared to bring-points with 9 to 33 kg per capita and civic amenity sites with roughly 6 kg per capita (bipro and Copenhagen Resource Institute 2015).

Installing PAYT schemes leads to better separate collection (and thus to higher recycling and recovery) than when applying flat charging rates for waste collection (bipro and Copenhagen Resource Institute 2015; EEA 2017b). For bio-waste, a

- door-to-door collection system,
- with bio-waste collected in one bin,
- and collection charged with mass or volume based fees²⁵ if accompanied with misuse and evasion strategies (e.g. against illegal dumping)
- in combination with regulations on municipal level that set minimum standards for collection

has been identified as primary success factor for high separate collection rates (bipro and Copenhagen Resource Institute 2015). Even though the system's running costs might be higher for door-to-door collection, capture rates and thus revenues are higher, while treatment costs are lower due to lower rejection rates (bipro and Copenhagen Resource Institute 2015).

Across the EU-27, on average only roughly 20 % of the municipal solid waste is collected separately, while around 80 % goes to the residual waste bin (bipro and Copenhagen Resource Institute 2015) – as bio-waste makes up around 1/3 of municipal waste on average (Hogg et al. 2014) this means that most of the bio-waste across the EU ends up either in thermal recovery or in landfills. Hence, if separate bio-waste bins should be encouraged and facilitated across all Member States. This, however, would need to go hand in hand with stricter rules as regards the landfilling of biodegradable waste so that once collected, bio-waste does not end up in landfills.

Making landfilling rules stricter as regards biodegradable waste

Landfilling biodegradable waste is not only a relevant source of GHG emissions to the atmosphere (EEA 2011) (see above 4.2.1), but also of air pollutants and odor – in particular of ammonia (NH₃) and hydrogen sulphide (H₂S) – which may be both a nuisance as well as a potential health issue (Lou et al. 2015; BMU 2006). Hence,

²⁵ In such systems, households are charged a fixed fee component (to cover basic costs of the waste collection system) and a flexible fee component, which is based on the actual mass or volume being binned – hence reducing waste generation yields cost savings on household level compared to flat fee systems, where the same (and thus in general a higher) amount is to be paid regardless of the actual amounts binned (bipro und Copenhagen Resource Institute 2015).

minimising the amount of biodegradable waste going to landfill promises environmental and social benefits.

Both the European Commission's and the European Parliament's proposals to amending the Landfill Directive (European Parliament 2017b; European Commission 2015d) as well as the provisional agreement between the European Parliament and the Council on the landfill directive proposal (European Parliament 2018b) suggest to oblige Member States to take measures that biodegradable waste, once collected separately according to the stipulations from the WFD, is not accepted in a landfill. Therefore, separate collection and stricter landfill rules must be implemented in combination to take effect.

The concrete measures are left to the discretion of the Member States, but should focus on shifting from landfilling to recycling, composting, biogas production or materials/energy recovery (see Article 5 (1) of the Landfill Directive).

As one example, the German government enacted a ban for landfilling of untreated biodegradable waste, which took effect from 1st June 2005 onwards, but required many preparatory steps on waste treatment up to 2005 (BMU 2006). Laid down in regulations²⁶, biodegradable waste could only be sent to landfills after it had undergone thermal or mechanical-biological treatment – so as to bring the waste into inert, stable and insoluble form releasing much less emissions – and only small residual quantities of stabilised organic material remained. There are also limits for organic content laid down in the law in order to guarantee specific waste characteristics prior to landfilling (BMU 2006). Not only did this result in raising the amount of organic waste recovered from 2 million tonnes in 1990 to 8 million tonnes in 2004 (BMU 2006), but also did since 2006 almost 100 % of the organic waste collected go to waste treatment by material or thermal recovery (Statistisches Bundesamt 2017). Although landfill bans may not be an option across the EU-28, implementing stricter rules are needed to reduce the amount of biodegradable waste going to landfill.

In this context, the proposals for amending the Landfill Directive suggest maximum shares of municipal waste generated allowed to going to landfill in the Member States – 10 % according to the Commission's proposal, 5 % according to the Parliament's proposal 10% or less according to the provisional agreement between the European Parliament and the Council on the landfill directive proposal (European Parliament 2018b). An impact assessment carried out in 2014 for the previous Commission on options reviewing targets, inter alia, in the landfill directive analysed the option of limiting the landfilling of municipal waste to 5 % (Hogg et al. 2014). It found that across the EU-27 by 2030 this option would

- increase the amount of municipal waste going to incineration by 21 %,
- reduce the amount sent to landfill by 15 %,

²⁶ The Technical Instructions on Waste from Human Settlements (Technische Anleitung Siedlungsabfall, TASI) and the Waste Storage Ordinance (Abfallablagungsverordnung, AbfAbIV).

- generate net financial costs of approximately 2 billion EUR by 2030 across the EU-27, mainly because incineration capacities would have to be built in countries where the low-cost option of landfilling waste prevails,
- generate environmental benefits of reducing external costs by roughly 500 million EUR in 2030 and
- creating some additional 46,000 jobs because incineration is associated with slightly higher demand for labour than landfilling.

Strengthening the focus on food waste in national waste prevention programmes

In order to achieve reductions in food waste generation and to apply the notion of a food use hierarchy (see above), Member States should strengthen the food waste focus in the national waste prevention programmes (NWPP).

By the end of 2015, national waste prevention programmes (NWPPs) were implemented in 31 European countries: the EU-28 plus Iceland, Liechtenstein and Norway. For the EU-28, food waste or organic waste is covered in all but the Finnish programme; however, only Belgium (partly), Estonia, France, Ireland, Lithuania, Malta, the Netherlands, Spain and the UK (partly) consider the entire WFD's scope of "bio-waste" (EEA 2015b).

Many Member States also apply measures targeted at food waste reduction – predominantly these are information instruments (e.g. labels, awareness-raising campaigns and pilot projects), but partially also voluntary agreements (some of which include clear targets; agreements mainly initiated by business associations) and economic instruments (EEA 2015b). The following Textbox provides a few examples of food waste measures implemented in NWPPs.

Hence, fostering NWPPs' foci on food waste and implementing specific measures to prevent food waste appears promising. Among specific measures, facilitating food donation (see chapter 4.1) and the use of former feedstuffs for animal feed (see chapter 4.4) as well as revising 'best-before' date labelling (see chapter 4.9) seem particularly relevant, not least because existing legislation was found to hamper food waste prevention, e.g. due to the waste status prohibiting or making more difficult the sharing or donation of food (Vittuari et al. 2017).

Box 1: Exemplary food waste measures implemented in NWPPs

Italy: Combining information, incentives and voluntary agreements to foster the distribution of surplus food from supermarket chains

Aimed at directing food in the distribution phase of the value chain away from becoming waste towards use in soup kitchens and 'solidarity markets', Italian regions proposed to combine information and awareness initiatives with economic incentives to encourage waste prevention. The implementation of activities to prevent or redistribute surplus quantities of food are based on voluntary agreements, in the form of Memorandums of Understanding, between public bodies (such as municipalities and government bodies responsible for waste management) businesses (for instance, retail organisations in the distribution phase) and civil society (e.g. voluntary associations and charities). (EEA 2015b see p. 39)

Germany: Providing organisational or financial support to food donation

Adopted in summer 2013, the German NWPP was based on several preparatory scientific studies, one of which evaluated examples from the almost 300 measures on waste prevention as regards waste prevention potential and ecological impacts (UBA 2013). In this context, the study assessed, inter alia, the food waste reduction potential of supporting food donation via food banks/charities. A public policy support measure could be to financially or organisationally support food banks/charities in their food donation efforts. This measure aims at reducing commercial food waste, generated in retailing or its upstream marketing and distribution channels. Although concrete waste prevention potential and environmental impacts could not be quantified, this support measure could further foster the food banks' impacts: in 2010, food donation via food banks managed to distribute food with an economic value of 2.3 million EUR to consumption, which would otherwise have been wasted (UBA 2013, 353).

England: Voluntary Agreement to reduce food waste along the food and drink supply chain

The English waste prevention programme was published in late 2013. Among its scope of measures, it also focuses on voluntary action along the food and drink supply chain – a prime example is the so-called Courtauld Commitment, a voluntary agreement launched in 2005 by the UK government's Waste and Resources Action Programme (WRAP) that focuses on reducing food (and packaging) waste in the grocery (food and drink) supply chain in the UK (EEA 2015b).

The Commitment operated in three distinct phases, which aimed at identifying ways to tackle food waste (Phase 1, 2005 to 2009); set a target of cutting household food and drink waste by 4 % (Phase 2, 2010 to 2012); and further cutting household food and drink waste by 5 % (Phase 3, 2013 to 2015 (Hirschnitz-Garbers et al. 2015).

Through its first two phases, the commitment contributed to preventing 2.9 million tonnes of waste, saving 4 billion £ worth economic value (DEFRA 2014). Furthermore, in addition to the business benefits, total household food waste could be reduced by 3.7 % (270,000 tonnes per annum), thus almost (92 %) reaching the target set for Phase 2 (WRAP 2017). This likely triggered annual savings of 700 million £ for consumers and 20 million £ for local authorities, while saving around 930,000 tonnes CO₂ equivalents annually (WRAP 2017).

Defining food waste in the amended WFD

The WFD as the main EU policy framework of action on waste management also covers food waste, but currently only as component of bio-waste and without providing a definition for food waste. In its Article 3 (4.) the WFD defines bio-waste as *"biodegradable garden and park waste, food and kitchen waste from households, restaurants, caterers and retail premises and comparable waste from food processing plants."*

In the most recent state of discussion (European Parliament legislative resolution of 18 April 2018 on the proposal for a directive of the European Parliament and of the Council amending the Waste Framework Directive) a definition of food waste is included. According to that definition "food waste means all food as defined in Article 2 of Regulation (EC) No 178/2002 of the European Parliament and of the Council that has become waste".

Developing a common methodology for measuring food waste

In order to monitor the effect of actions to prevent and reduce food waste in line with SDG 12.3, a common methodology for measuring food waste across the EU-28 needs to be put in place to ensure uniform measurement of food waste by authorities and other stakeholders.

The European Parliament legislative Resolution of 18 April 2018 on the proposal for a Directive amending the Waste Framework Directive "requires the Commission to assess the feasibility of setting up a binding Union-wide food waste reduction target to be met by 2030 and to adopt a delegated act establishing a common methodology and minimum quality requirements for the uniform measurement of levels of food waste".

In this context, when developing the methodology, the European Commission can build on the preparatory work undertaken in the FUSIONS project, which provides a "Food waste quantification manual to monitor food waste amounts and progression" (Tostivint et al. 2016) as well as the Food Loss and Waste Standard developed by the WRI and partners. Discussions about appropriate monitoring approaches are also part of the EU Platform on Food Losses and Food Waste²⁷.

Policy recommendations for food waste measurement and monitoring are however not at the core of REFRESHs work to develop policy recommendation (see chapter 3), and are therefore not discussed further in this report.

Setting binding targets for avoiding food waste

Setting targets not only makes achievement of progress more binding, but also "monitorable" so that stakeholders can hold governments accountable for missing targets. Setting targets usually also increases political commitment and also priority (European Court of Auditors 2016). Environmental NGOs stressed the

²⁷ Pending the adoption of the Waste Framework Directive, the Commission has started this process by discussing possible elements to be considered in elaborating the methodology as well as sharing experiences of members in regard to food waste quantification together with the Platform members.

relevance of binding targets for food waste prevention (see e.g. EEB 2017). The European Environment Bureau (EEB) and Friends of the Earth Europe criticised that the CE Action Plan from 2015 no longer includes the target proposed by the previous Action Plan of reducing food waste at least by 30 % by 2025 (see EEB 2015; Friends of the Earth Europe 2015). The Parliament proposal not only calls for reinstating this target, but adds a target for the longer term: *"In order to contribute to the prevention of waste, Member States shall aim to achieve at least the following objectives: [...] (d) a Union food waste reduction target of 30 % by 2025 and of 50 % by 2030 compared to the 2014 baseline [...]"* (European Parliament 2017a: Amendment 145).

The provisional agreement between the European Parliament and the Council on the waste framework directive proposal (European Parliament 2018c) stipulates an indicative Union-wide target whereby Member States should aim to achieve an indicative Union-wide food waste reduction target of 30 % by 2025 and 50 % by 2030 in order to contribute and ensure to be on track towards the attainment of the United Nations Sustainable Development Goal.

On a EU-28 wide level, the European Commission looked at potential impacts, inter alia, of setting a target of reducing food waste by 30 % by 2025 in its impact assessment for the 2014 Circular Economy Action Plan (European Commission 2014a). The impacts considered therein encompass environmental and economic aspects and are modelled in a spreadsheet tool in Microsoft Excel (European Commission 2014a see p. 42 and following for more information on the model). In summary, the impacts modelled for 2025 are (European Commission 2014a, 58):

- direct implementation cost of implementing food waste prevention programmes (e.g. staff cost, communication material costs) could amount to around 66 million EUR across all Member States;
- achieving a net benefit of around 630 million EUR, taking into account the savings achieved in costs for collecting and treating food waste;
- reducing food waste by 157 million tonnes, leading to around 71 million EUR in economic value of food saved;
- freeing up of 21,500 km² of land for other uses due to less land needed for production food that later becomes food waste;
- reducing greenhouse gas emissions by 66 Mt CO₂ equivalents;
- Generating economic savings of 3.75 billion EUR from avoiding environmental costs associated with greenhouse gas and air pollution emissions.

However, despite the above potentially very positive impacts, the assessment also notes that successfully reducing food waste could mean lowered sales of food items in some parts of the food production sector. A reduction in food waste could lead to consumers 'trading up', i.e. purchasing higher value foods with some of their savings, while ignoring or abandoning earlier food choices. Thus, successfully reducing food waste could mean lower sales, which could impact negatively on

some parts of the food production sector and would generate potential losers²⁸ for some producers if waste reduction leads to direct reduction in demand for certain food products (European Commission 2014a, 58).

On the other hand other producers will benefit from increasing demand, increasing sales and increasing income. There are also opportunities related to new businesses models or products, which can be produced by using the land that is not needed anymore to produce food etc.

Therefore, a concerted food waste policy effort would need to look at potential winners and losers alike, trying to minimise creating losers and/or aiming for compensating measures.

4.3 Food Safety and Hygiene

4.3.1 Overview

According to Regulation (EC) No 853/2004, a regulatory part of the Food Hygiene legislation, “food hygiene” is defined as:

...“the measures and conditions necessary to control hazards and to ensure fitness for human consumption of a foodstuff taking into account its intended use.”

Regulations regarding food safety and hygiene are set up to protect humanity against food that has gone unsafe, protecting us from getting ill but also ensuring that the food we eat is of high quality. The regulations regarding food safety and hygiene (e.g. temperature conditions during storage or processing, measures to avoid (cross-) contamination by (micro-)biological, chemical and physical hazards) etc. are thus important rules to avoid food waste by preventing that food become unfit for human consumption.

In the legislation the priority is to make food safe and fit for human consumption in order to protect human health. This is also stated by the European Parliament (European Parliament 2017c) which also calls on the Commission to encourage competent authorities in the Member States to adopt measures to control the safety of food from the point of view of health wherever necessary in order to build citizens’ and consumers’ trust in policies which contribute to food wastage reduction.

Table 1 provides an overview of policies relevant to food safety and hygiene. In the following sections possible links to food waste are explored. This overview of food safety and hygiene rules has focused on legislation included in the hygiene package as well as implementing and derogating acts and key related rules as described by the European Commission. Legislation left out from the overview in this chapter include regulations more closely related to date marking such as EU FIC Regulation (EC) No 1169/2011 on food durability and date marking although they also link to the issue on food safety and are explained in chapter 4.9 on “**Fehler!**

²⁸ And the quicker the food waste reduction, the more difficult the reduction in sales of certain food products would be for producers, as they would have less time to make a transition to the new situation, i.e. finding other markets for their products, diversifying etc.

Verweisquelle konnte nicht gefunden werden. Legislation more closely linked to animal feed, although relevant to food safety, is described in 4.4 **“Fehler! Verweisquelle konnte nicht gefunden werden.”**. Further, regulations setting maximum levels for certain contaminants in foodstuffs or procedures to set maximum tolerance limits for substances not intentionally added to food are left out (e.g. Regulation (EEC) No 315/93 and Regulation (EC) No 1881/2006) as the level of detail is not suitable for the current overview.

Table 1. Overview of EU legislation regarding food safety and hygiene.

	Legislation	Short description
<i>Included in the food hygiene package.</i>	Regulation (EC) No 852/2004	Lays down general rules on the hygiene of foodstuffs for food business operators.
	Regulation (EC) No 853/2004	Lays down specific hygiene rules for the hygiene of foodstuffs of animal origin.
	Regulation (EC) No 854/2004	Lays down specific rules for the organisation of official controls on products of animal origin intended for human consumption.
<i>Implementing and delegated acts of the food hygiene package (former PRAC²⁹)</i>	Regulation (EC) No 2073/2005	Regulation on microbiological criteria for foodstuffs.
	Regulation (EC) No 2074/2005	Regulation laying down implementing measures on for certain products under Regulation (EC) No 853/2004, 854/2004 and 882/2004. Derogating from Regulation (EC) No 852/2004 and amending Regulations (EC) No 853/2004 and 854/2004.
	Commission Implementing Regulation (EU) 2016/759	The regulation includes lists of third countries and territories from which MS have to authorise the introduction of certain products of animal origin intended for human consumption into the EU.
	Commission Implementing Regulation (EU) 2015/1375	Includes specific rules concerning official controls for <i>Trichinella</i> in meat.
<i>Related key rules to the food hygiene package.</i>	Council Directive 2002/99/EC	Lays down animal health rules regarding production, processing, distribution and introduction of products of animal origin for human consumption.

²⁹ The Pharmacovigilance Risk Assessment Committee, the European Medicines Agency’s Committee responsible for the assessment and monitoring of the safety of human medicines (European Medicines Agency, 2017).

	Legislation	Short description
	Regulation (EC) 178/2002	Lays down general principles and requirements of food law and procedures in matters related to food safety. The regulation also establishes the European Food Safety Authority.
	Regulation (EC) 882/2004	Regulation on official controls performed to ensure the verification of compliance with feed and food law, animal health and animal welfare rules.

The three acts of the food hygiene package

In April 2004 the European Parliament and the Council adopted rules on hygiene of foodstuffs, the so called “hygiene package”, see Table 1 (European Commission 2017i). The rules are formulated to cover all stages of the production, processing, distribution and placing on the market³⁰ of food intended for human consumption (European Commission 2017e). The purpose of the 2004 hygiene package was to merge, harmonise and simplify a number of previous Council Directives on the hygiene of foodstuffs of animal origin as well as the placing on the market of such products (European Commission 2017i). By separating three different areas, public health, animal health and official controls, the new package would be more coherent (European Commission 2009).

The regulations lay down general principles and requirements of food law and procedures to matters related to food safety, set rules on official controls to ensure compliance concerning food and feed law as well as animal health and welfare. Regulation No (882/2002) also aims to guarantee fair trading practices in food and feed trade, protecting consumer interest, including labelling and other consumer information measures, see 4.9 Product information and date labelling.

Flexibility in the hygiene rules is permitted for some establishments and may grant derogations or adaptations from some requirements in the annexes of the hygiene regulations (European Commission 2010). It is applicable for e.g. remote areas and for traditional production and methods (European Commission 2017e). The requirements Regulation (EC) No 852/2004 are set generally as all sectors need to comply with the regulation and thus also include a high level of flexibility regarding their practical implementation (Commissions Notice 2016/C 278/01). Annex III of the same notice explains the flexibility provided for certain food establishments by EU legislation. It considers flexibility within the implementation of prerequisite programs (PRP) (generally to facilitate PRPs for smaller enterprises), Food Safety Management (or control) systems, and the HACCP-principles.

³⁰ “Placing on the market” regards the holding of food for the purpose of sale, including offering for sale or any other form of transfer (free of charge or not) and the sale, distribution and other forms of transfer (European Commission 2017e).

Regulation (EC) No 852/2004

Regulation (EC) No 852/2004 on the hygiene of foodstuffs lays down general rules for food business operators e.g. on food premises, transport, food waste, provisions to the wrapping and packaging of foodstuffs and heat treatment. The regulation states that food business operators are primarily responsible to ensure that relevant hygiene requirements in the regulation are met under all stages of production, processing and distribution of food under their control. Food operators must follow hygiene measures including for example:

- compliance with microbiological criteria for foodstuffs (see Implementing and delegated acts of the food hygiene package),
- compliance with requirements regarding temperature control,
- maintaining the cold chain,
- and sampling and analysis.

According to the same regulation food operators must also implement and maintain procedures based on the Hazardous Analysis and Critical Control Points principles³¹ (HACCP) which include:

- identifying hazards to be prevented, eliminated or reduced to acceptable levels.
- identifying the critical control points at the step/steps where control is essential in order to prevent/eliminate a hazard or reduce it to acceptable levels.
- establishing critical limits at the critical control points that separate acceptability from unacceptability for the prevention, elimination or reduction of hazards to acceptable levels.
- establishing monitoring procedures.
- when needed, establishing corrective actions.

852/2004 states that all organisations dealing with food must be registered as a food business operator³². Hence the demands listed above needs to be met. There is a flexibility provided to adapt the above criteria to the size and the nature of the food business (Laid down in Art 5(2)(g), 5(4)(a) and 5(5)) and further clarified in

³¹ Hazard Analysis and Critical Control Point (HACCP) is a practical system developed to help food business operators control hazards in food and provides procedures to make sure that the produced food is safe to consume (European Commission, 2005).

³² Food operator is defined in Regulation 178/2002 as “any undertaking, whether for profit or not and whether public or private, carrying out any of the activities related to any stage of production, processing and distribution of food;”

Recital 15 of the Regulation and in the guidance documents, adopted and published by the Commission in 2016³³ and 2017³⁴.

Annex II of Regulation 852/2004 also includes chapters regarding food waste where it is briefly stated requirements on how to contain, store and to discard of food waste, non-edible by-products and other refuse in a safe way.

Regulation (EC) No 853/2004

Regulation (EC) No 853/2004 lays down specific hygiene rules for food of animal origin e.g. a variety of meat products, fishery products, raw milk and dairy products and eggs and egg products for food business operators. Included are requirements on identification marking, objectives of HACCP-based procedures and food chain information. The requirements include various and product-specific requirements on transport and storage, treatment, slaughter hygiene and labelling requirements among others.

As an example of the importance of the legislation it can be mentioned that the combination of eggs and *Salmonella* is still the most frequently reported cause of foodborne outbreaks according to the annual EFSA/ECDC reports on zoonoses³⁵.

Regulation (EC) No 854/2004

Regulation (EC) No 854/2004 lays down specific rules for the organisation of official controls on products with animal origin intended for human consumption.

Implementing and delegated acts of the food hygiene package, Regulation (EC) No 2073/2005

The three acts of the food hygiene package are backed up with implementing and delegated acts. Regulation (EC) No 2073/2005 includes rules on microbiological criteria for foodstuffs. According to the legislation a "microbiological criterion" means

"a criterion defining the acceptability of a product, a batch of foodstuffs or a process, based on the absence, presence or number of micro-organisms, and/or on the quantity of their toxins/metabolites, per unit(s) of mass, volume, area or batch".

The microbiological criteria are listed in three chapters of Annex I in the Regulation and include food safety criteria, process hygiene criteria for various products and rules for sampling and preparation of test samples.

The food safety criteria include a list of food categories e.g. ready-to-eat foods, minced meat, cheeses and pre-cut foods and vegetables. For each food category, limits for certain microorganisms that can be found in each food category, e.g. for ready-to-eat foods for infants the regarded microorganism is *listeria monocytogenes* and the criterion is set as absence in 25 g. The criteria are also

³³<http://eur-lex.europa.eu/legal-content/EN/TXT/PDF/?uri=OJ:C:2016:278:FULL&from=EN>

³⁴ https://ec.europa.eu/food/sites/food/files/safety/docs/biosafety_fh_legis_guidance_mngt-systems-sfr-fsms_en.pdf

³⁵ EFSA Journal 2016;14(12):4634, 231 pp. doi:10.2903/j.efsa.2016.4634, ISSN: 1831-4732

accompanied with an analytical reference method and the stage in which the criterion applies e.g. “products placed on the market during their shelf-life” for ready-to-eat foods for infants. There are 26 food categories listed in the food safety criteria list.

There are process hygiene criteria for meat and products thereof, milk and dairy products, egg products, fishery products and vegetables, fruits and products thereof. The criteria list include the same information as abovementioned and additional information on what measures need to be taken if the results are unsatisfactory.

If the criteria listed in Annex I of the regulation are not met according to the testing results, the food business operator must take appropriate measures:

- The product/batch is withdrawn/recalled in accordance with Article 19 of Regulation (EC) No 178/2002.
- Products that have not reached retail but are already placed on market can be further processed to food or feed, if the further processing eliminates the hazardous content. The treated food product may then be used by the food business operator for other purposes than originally intended provided it does not impose public or animal risk.
- MSM not fulfilling the *Salmonella* criterion may be used but only to produce heat-treated meat products in accordance to Regulation (EC) No 853/2004.
- The actions listed in the process hygiene criteria should be taken if results are unsatisfactory concerning the process hygiene criteria.
- Measures must also be taken to find the reason behind the unsatisfactory results to prevent it from reoccurring e.g. HACCP-measures.

4.3.2 Impacts and opportunities for development

As mentioned the food safety and hygiene regulations are there to ensure that food for human consumption is safe in order to protect human health. These regulations have been developed with safe food as the main target. In some cases this is causing unnecessary food waste. Below some examples are listed for when possibilities exist to further develop the interpretation of the food safety and hygiene legislation in order to reduce food waste.

Food safety vs food waste

Regulations regarding food safety and hygiene are set up to protect humanity against food that has gone unsafe, protecting us from getting ill but also ensuring that the food we eat is of high quality. There are a number of examples when risk managers have accepted certain risks in order to reduce losses during food production e.g.:

- Absence of *Salmonella* food safety criteria in fresh meat other than poultry
- Absence of a food safety criterion other than *Salmonella* Enteritidis and *Salmonella* Typhimurium in fresh poultry meat

- Process hygiene criteria (no need for recall) in case of food safety criteria in case of *Campylobacter* (and only in meat broilers)

However there are also examples when food safety combined with the interpretation of the legislation would drive food waste.

Eggs as an example:

In the EU/European Economic Area eggs have to reach consumers within 21 days after laying according to the hygiene rules. The reason for the implementation of the rule is the growth rate of *Salmonella* and storage in room temperature (Møller et al. 2016). Further, class "A" marked eggs (table eggs) must be labelled with a "best before" date set at 28 days from laying (Article 2 of Regulation (EC) No 589/2008 laying down rules for implementing Council Regulation (EC) No 1234/2007 as regards marketing standards for eggs, see section 4.9 on date marking). This means that consumers have one additional week to consume the eggs after they are purchased day 21 from laying, if they want to consume the eggs before the "best before" date.

According to Møller et al. (2016) unnecessary food waste arises in the Nordic countries as most consumers store their eggs in refrigerators (limits the growth of *Salmonella*) and *Salmonella* is less likely to be found in laying hens in the Nordic countries. Nordic eggs have a durability of 28 – 35 days, 28 days being a quality limit and not linked to safety parameters (Møller et al. 2016). The same argument is also stressed by the Swedish Food Federation³⁶. There are no studies made looking into if prolonging the best before dates on eggs would decrease egg waste, but more general studies show that longer best before dates will decrease food waste (WRAP 2015, 2015; Westergaard-Kabelmann and Dalgliesh-Olsen 2016).

On the other hand the strict time rules also allow being flexible on the temperature conditions of eggs during storage and transport while maintaining the safety and will give at least 7 days for the final consumer to use the eggs.

The opportunities for improvement may lay in not regulating eggs separate from other food products but rather to let food business operators set the durability and date label themselves, as they do for other products, based on the conditions in their value chain (e.g. temperature during transport). To avoid *Salmonella* guidelines on possible shelf life in relation to e.g. storage conditions could follow. Further, retailers should make better use of the possibility to deliver eggs after the 21st day after laying to the egg processing industry producing egg products and processing eggs with appropriate treatment making sure they can still be used.

Controlled food safety as an example:

In many cases there are openings for food being used within the food industry even if it can't be sold to households. Two examples are:

- Eggs sold must be without breaks. Cracked eggs may however be used for production of egg products if they are directly delivered to a processing

³⁶ Email exchange with Niklas Amelin, Swedish Food Federation, February 2018

establishment and broken as soon as possible. After breaking, the egg product must undergo processing to eliminate/reduce to acceptable levels microbiological hazards. This can be seen as food waste prevention.

- For batches being withdrawn for any reason there is a possibility to send this food for re-processing. This is not always done due to different reasons, it could be too costly but it could also be that the operator lacks that sort of equipment.

The opportunity for improvement is to facilitate more for food business operators to actually take these measures rather than throwing the food to waste. This means facilitation in knowledge, in economic terms and in guidance.

Flexibility as an act of prevention or a driver – Interpretation of the legislation

The food hygiene package is written in a flexible manner allowing for adjusting to different circumstances hence making the most of the produced food. However in some cases the legislation in itself is not a food waste driver but the application of the same is. The stated flexibility also means that the application of the legislation varies. It can vary from EU to national level but also between different inspectors. How legislation is applied has to do with how the inspectors are directed by the authorities.

The European Commission keeps a register of national guidelines related to hygiene practices in order to make possible the exchange of good practices between MS and food business operators. The guidelines on how to comply with hygiene legislation are developed by specific sectors in different Member States. The guidelines may contribute to reducing food waste as they only consider requirements needed to meet required level of safety (ECA 2016). However, even if such a register exists, Member States have expressed concern regarding insufficient exchange of knowledge at EU level (ECA 2016).

The Commission efforts to provide training to competent authorities under the Better Training for Safer Food Programme³⁷ on the implementation of hygiene rules, including HACCP and flexibilities, in order to get a better understanding and harmonised implementation should be acknowledged.

An actual example raised from a Swedish contact is that one example of when interpreting legislation leads to food waste is the application of Annex II of Regulation 852 which states that foodstuffs should be safe from a microbiological point of view: If a batch of food is cooked and the producer wants to cool it and sell it the next day, authorities *can* demand that the cooling process of 4-6 hours should be monitored (since the cooling process should be fast and is crucial concerning microbiological growth). This means that the staff needs to work longer hours to fulfil the demand (to be able to stay on the premises to monitor the cooling), a cost the business most likely will not take if the option is to discard the food instead. To reduce food waste it would be needed that it is seen as an option to make sure that the cooling routines and cooling equipment will make sure the

³⁷ <http://ec.europa.eu/chafea/food/about.html>

same demand (the monitoring of the cooling) is met without staff being present. On the other hand in Finland³⁸ the monitoring has not been raised as an issue which shows that focus is put on different matters in different Member states.

The opportunity for improvement lays within increasing the harmonisation even further (as for example done with in the area of food donations) but also to have food waste in mind as a parameter when discussing food hygiene and safety. Preferably this will be done in a “guidance harmonisation” rather than a strict regulation harmonisation since there might be different circumstances in different Member States.

Food donation and food safety

Food donations is not the main scope of the policy review, however in terms of food safety, the redistribution of food surplus is hindered due to certain requirements in the food hygiene legislation, and interpretation of such legislation, which leads to food waste (Vittuari u. a. 2015). The Commission also acknowledges food hygiene provisions as being one of the areas relevant to food donation and that donation is not used to its full potential (European Parliament 2017c). Redistributing food surplus of animal origin to another establishment (i.e. not final consumer) requires the food business operator to comply with Regulation (EC) No 853/2004 as well as being approved by the national authorities, creating an administrative burden (O’Connor, Gheoldus, and Jan 2014a). Similar rules apply for feed (see further chapter 4.4). The same protection under the hygiene rules applies independent of if the food is marketed to consumers or redistributed, i.e. food hygiene legislation is also to be met in the redistribution, delivery and handling of food surplus. However, food hygiene measures are less strict regarding retailers that supply food directly to the final consumer, including caterers³⁹, compared to the previous stages in production and manufacturing. This is because the traceability requirements in Regulation (EC) 178/2002 do not apply when the final consumer is at the receiving end. In the recent guidance document provided by the Commission on food donation⁴⁰ it is however explained that as regards the redistribution of surplus food, including the need for approval of retailers by competent authorities, this is not the consequence of EU rules but rather the fact that of national authorities do not make use of the flexibility provided by the EU rules, in particular Art 1(5)(b)(ii) of Regulation (EC) No 853/2004.

³⁸ Communication with Anu Reinikainen at Luke (Natural Resources Institute Finland), February 2018

³⁹ Article 3 of Regulation (EC) No 178/2002 defines ‘retail’ as “the handling and/or processing of food and its storage at the point of sale or delivery to the final consumer, and includes distribution terminals, catering operations, factory canteens, institutional catering, restaurants and other similar food service operations, shops, supermarket distribution centres and wholesale outlets”.

⁴⁰ EU Guidelines on food donation 2017/C 361/01 <http://eur-lex.europa.eu/legal-content/EN/TXT/PDF/?uri=OJ:C:2017:361:FULL&from=EN>

4.4 Special case: use of former food for animal feed

4.4.1 Overview

This chapter first reviews the legislation currently regulating the use of surplus food in animal feed. Second, it makes **recommendations to increase the uptake of former foodstuffs, as defined in the legislation, in animal feed**. This second part focuses on the **simplification of existing logistical and administrative burdens without changing the types of surplus food are currently permitted and prohibited in animal feed**. The third part of the chapter considers **legislative change to allow the feeding of heat-treated catering waste and meat-containing surplus to omnivorous non-ruminant livestock, as is currently done in Japan**. We point to the potentially significant volumes of food waste, not fit for human consumption, that could be kept in the food chain, and the environmental and economic benefits resulting from reduced feed costs and feed crop land use. Fourth, the next steps for developing technical guidelines and policy recommendations for regulating the safe use of surplus food in non-ruminant feed are described.

Risk management of prion and other foodborne animal diseases is a central aspect of the legislative framework regulating the use of 'former foodstuffs' in animal feed. According to Regulation 68/2013, Catalogue of Feed Materials, 'former foodstuffs' are defined as "foodstuffs, other than catering reflux (catering waste), which were manufactured for human consumption in full compliance with the EU food law (Regulation 178/2002) but which are no longer intended for human consumption for practical or logistical reasons or due to problems of manufacturing or packaging defects or other defects and which do not present any health risks when used as feed". The concept of "former foodstuffs" in this document follows the legal definition. When we refer to surplus, we mean other types of food produced for human consumption but which are currently not permissible in animal feed. It is also important to note that the legal definition does not consider the fact that many "former foodstuffs" may well be suitable for redistribution for human consumption. The European Association of Former Foodstuff Processors (EFFPA, 2017) states that "EFFPA fully supports the responsibility of food producers to consider the donation of foodstuffs to people in need first.

The Waste Framework Directive states that former foodstuffs (FFs) are automatically classified as waste unless the responsible business operator makes clear that it intends the former foodstuff to be used as feed. "Food which has passed its "best before" date can be used as a feed provided that those products are safe for the animals. Highly perishable food where the "use by" date has expired can only be marketed and used as a feed material if no risk to public or animal health has arisen from a risk assessment" (European Commission 2017h, 5). Belgium and Germany have an arrangement that allows waste to be upgraded back to feed. The main problem arises in countries where former foodstuffs are placed on the market as feed and then environmental authorities judge it as waste. A solution to this problem would be to stop challenging the feed status of former foodstuffs in MS.

Regulation 999/2001 prohibits the feeding to ruminants of most types of animal protein. This prohibition was first temporarily extended to non-ruminants in countries considered to have a high risk of Transmissible Spongiform

Encephalopathy (TSE) / prion disease, and later made permanent EU-wide by amendments 1923/2006 and 56/2013. Put simply, **farmed animals, whether they are ruminant or non-ruminant, herbivore or omnivore, are not allowed to eat meat, fish, ruminant collagen and gelatine, or any products containing these.** Low risk animal by-products (ABPs) such as processed milk or eggs are allowed, and later amendments include exceptions allowing pigs and poultry to eat fish meal, and fish to eat non-ruminant ABPs. Additionally, it is permitted to feed blood products and di-calcium and tri-calcium phosphate of animal origin to non-ruminant livestock.

Regulation 1069/2009 (laying down health rules on ABPs not intended for human consumption) enshrines the ban on using kitchen left-overs and catering waste, and the ban on intra-species recycling, and defines categories of ABPs according to their level of risk. For instance, "a former food contaminated by pathogen bacteria is considered as category 2 material and shall not be used for feeding farmed animals" (European Commission 2017h, 6). Regulation 142/2011 implementing Regulation 1069/2009 specifies how low-risk category 3 ABPs that have not been prohibited need to be processed before they can be fed to farm animals (for example, heat raw milk to 72°C for at least 15 seconds).

Permissible ABPs (including products processed as food) intended for feed use are not considered waste and fall under animal health and feed legislation. These products must comply with the feed safety requirements according to Regulation 767/2009 ("Placing on the market and the use of feed") and Regulation 1069/2009. Regulation 1069/2009 also "establishes a general registration duty for operators active at any stage of the generation, transport, handling, processing, storage, placing on the market, distribution, use or disposal of ABPs, including former food with animal products" (European Commission 2017h, 6). Food businesses wishing to supply FFs for feed must ensure that these foodstuffs do not contain any prohibited ABPs such as meat or ruminant gelatine and meet strict segregation requirements to avoid cross-contamination with prohibited ABPs. Most of the above restrictions do not apply to pet food.

Regulation 183/2005 (laying down requirements for feed hygiene), requires registration as Feed Business Operator with the competent authority for all food and feed businesses that produce, use, retail or market feed or feed ingredients. For example, in the UK and the Netherlands a bakery wishing to supply surplus bread to a former food processor must go through the full registration process, while in Belgium and Italy a bakery does not need registration, as long as they deliver their bread to registered distribution centre

4.4.2 Impacts and opportunities for development

Overall, **the obligations – registration and compliance with zero tolerance for contaminants, such as traces of packaging, in feed auditing and certification of Good Manufacturing Practice, labelling, and segregated storage and transportation - are considered too burdensome by many food business operators and retailers to justify sending FFs to feed** (European Commission 2017h). This is particularly true for smaller quantities of FFs. As a result, **FFs are wasted instead of being used as feed, despite economic and environmental incentives.** Certain administrative and logistical requirements

could be simplified while continuing to ensure that food businesses act as responsible feed suppliers. This should be possible given the financial compensation food producers obtain for selling former foodstuffs. This is less of an issue for agri-food and biofuel industry by-products such as rapeseed meal or molasses.

Increasing uptake of former foodstuffs without changing legislation

European Commission Guidelines on the use of former foodstuffs as feed

The European Former Foodstuffs Processors Association (EFFPA) estimates that currently 5 million tonnes of FFs (mostly bakery and confectionary-type goods) are processed into animal feed. According to EFFPA estimates, **continued innovation in processing and de-packaging technology and expansion to other food chain sources could grow the sector to up to 7 million tonnes annually by 2025** (EFFPA 2017). The industry will need help to overcome the **complex legal, bureaucratic and logistical barriers resulting from applicable EC Regulations and the way in which national and local authorities implement them. The new Commission Guidelines on the use of former foodstuffs as feed published as Commission Notice in April 2018 help clarify and simplify some of the barriers** (European Commission 2018).

For further simplification, it may help to provide separate guidelines for food businesses and farms where there is zero presence of ABPs, such as a vegan sandwich manufacturer or pea canning factory.

Minimizing registration requirements for former foodstuff suppliers

Some competent authorities require registration of the food business as feed business operators (FeBO) according to the Feed Hygiene Regulation (183/2005) only when food is directly delivered to farmers (European Commission 2017). However, in many Member States (MS), these requirements apply even if the products are delivered to approved former food processors. Given that these processors are specifically set up to meet feed safety requirements, one solution is to **minimise the registration requirements for former foodstuff suppliers to former food processors. Hazard Analysis and Critical Control Points (HACCP) measures to ensure compliance with feed safety legislation could be handled through the contract between the FF supplier and processor**, though in certain cases FF processors prefer their suppliers to be registered as this gives leverage in terms of demanding compliance. Furthermore, authorities could reduce the frequency of official inspections subject to the principle of “earned recognition” which would work most easily through membership of an officially approved private feed assurance/quality scheme which operators join to simplify compliance with feed law. In addition, **as the Commission and member states further simplify and harmonise HACCP, cold chain and other logistical requirements for food donation** (see Chapter 5.2 Food Safety and Hygiene), it is important these **simplified measures are aligned and combined as much as possible with similar requirements for the handling, transport and storage of former foodstuffs for use in animal feed.**

The registration requirement may also discourage manufacturers and retailers from supplying FFs to the feed industry because consumers may mistakenly perceive this as a sign of lower quality (Luyckx 2016b). Awareness raising is needed to show

how it is in fact overly strict quality control and branding (for example the exact colour of a printed logo or redesigned packaging) that leads to the creation of FFs in the first place, and not low quality. Furthermore, FF processing should be seen as part of a 'zero waste' sustainable business strategy for food operators. Food operators could promote their engagement in the FF industry as part of their environmental responsibility.

Exempting FF destined for feed from paperwork requirements

Some former food processors transporting packaged biscuits containing milk ingredients across borders between MS report being fined for not having the relevant waste paperwork (Annex VII documents). This is a specific example to demonstrate the occasional difficulties with cross-border trade of FF, especially from Germany to the Netherlands. This relates to FF being viewed as waste in the one country and waste not being allowed to be fed to animals in the other country. Some harmonisation would be necessary. And in some MS, suppliers of former foodstuffs must submit a certificate of evidence to avoid their former foodstuffs being automatically classified as waste (European Commission 2017h). One solution is to **require FF destined for feed to be labelled as feed and exempt it from additional paperwork related to the waste legislation.**

In addition, "category 3f materials" (e.g. products containing milk powder or honey, or cakes that have been baked and thus the eggs received heat treatment) require labelling and documentation according to the ABP Regulation. This is seen as an unnecessary administrative burden as these types of ABPs have already been processed as a food so are exempt from further processing requirements. They do not necessarily pose a greater feed safety risk than FFs without ABPs (European Commission 2017h). One solution is to **include a statement confirming the products only contain permissible processed ABPs (e.g. non-ruminant gelatine, heat-treated milk etc.) in the aforementioned labelling requirement, and not require further paperwork.**

The above labelling requirements would need to be streamlined with the provisions in Chapter 4 of Regulation (EC) No 767/2009 concerning presentation, labelling and packaging that applies to their placing on the market. For bulk consignments of feed materials, the labelling particulars can be given on accompanying documents (European Commission 2017h).

Providing manufacturers training and logistics to facilitate compliance with segregation logistics

Any food that is going to be used in feed needs to be segregated throughout production, storage and retail. Most former foodstuffs currently processed into feed come from manufacturers who apply HACCP processes to ensure continuous segregation. Manufacturers and retailers that handle prohibited ABPs and currently do not send their surplus to feed - out of fear of not complying with full segregation - could be supported with **staff training and infrastructure support to allow permissible former foodstuffs to be safely segregated. Local authority feed hygiene inspectors also may need training to provide advice that encourages maximum uptake of FFs in feed and dissuades food businesses from sending surplus to Anaerobic Digestion (AD) as an easy way to avoid landfill.**

In the UK supermarket sector, only Tesco and Sainsbury's send surplus bread to former food processors, and only bread from the in-store bakeries (WRAP 2016, 2016; Sainsbury's 2016). **More detailed guidelines could be provided to encourage more FFs to be sent to FF processors where segregation is provided by packaging.** Furthermore, HACCP and business support could be given to other retailers to make the business and environmental case for sending bakery surplus to feed.

Case study: Colruyt, Belgium. Colruyt found that food banks are unable to take the amount of surplus bread generated by retail. Wishing to reduce its environmental impact, Colruyt invested in HACCP processes to ensure segregation and reported a financial loss reduction of 280,000 EUR from sending surplus bread to animal feed (De Meester 2017). Since 2016, one of the largest retailer in Austria (Spar) collects surplus bread at four out of six logistic centres for further processing to feed, as a consequence of a research study where the financial impact of unsold surplus bread, and the corresponding ethical responsibility of the retailer was highlighted (Spar Holding AG 2016). Best practice guidelines based on such experiences could be developed. **Guidelines on former foodstuffs as just published by DG Sante draw mainly on challenges encountered by food manufacturers, while retail surplus remains a largely untapped resource for former foodstuffs. Authorities could also work with pioneering retailers to further identify unnecessary logistical and legal barriers.**

Preventing overly strict interpretations of durability dates

Some MS automatically categorise products with passed durability dates as category 2 ABP material, with no mechanism that allows feed business operators to prove such FFs can be safe feed. This is an overly strict interpretation of the law: If they can be proven to be safe, FFs past their use by or best before date (relevant to human use) can be used in feed. Regulation 767/2009 requires a durability date for compound feed but not for feed materials (European Commission 2017h). **Any new guidance or legislation on human food date labelling should be checked from a "former-foodstuffs-for-animal-feed" perspective to ensure that there are no unforeseen impacts using FFs in feed,** bearing in mind that the food date is just one indication of the feed suitability of a foodstuff.

Simplifying cross-contamination prevention requirements and preventing downgrading of FFs

Transport: Food hygiene legislation (Regulations 178/2002, 852/2004 and 1069/2009) require food and ABPs for feed to be kept segregated at all times during storage and transport. For example, if a dairy wants to place a specific consignment of milk on the market as feed instead of for human use, the milk becomes a category 3 material under the ABP law. It can then only be transported in a truck intended for ABP, not in a food truck (even after cleaning). This is unrealistic and disincentives the use of former food as animal feed. In some MS, **feed ingredients/FF, regardless of whether they contain Category 3 materials such as milk or butter, can be transported by any means as long as the feed ingredients/FF are placed in sealed containers to prevent cross-contamination. In other words, Section 1(3), of Annex VIII of Regulation 142/2011 could be made applicable and sufficient in all cases.**

Downgrading FFs: Some private audit systems automatically downgrade FFs to waste, or Category 2 ABP, after it has fallen on the floor. However, provided the food producer has a protocol to keep floors clean and ensures compliance with feed legislation criteria for microbiological, chemical or physical contamination, the contact with the floor does not exclude the former food being used as feed. The operator's mandatory HACCP system should address the risk by identifying, assessing and taking adequate measures (European Commission 2017h). This could be encouraged in the Commission's guidance document.

Micro-margins for packaging materials: Although de-packaging technology is improving, it is difficult to prevent traces of packaging materials appearing in the final feed product. There is a **"technical zero" approach** to non-authorized GM material in feed (introduced by Commission Regulation 619/2001) and a similar **micro-margin approach** could be adopted for **packaging**.

Authorise ruminant gelatine

Due to the current feed ban on ruminant gelatine an estimated 100.000 tonnes of former foodstuffs containing ruminant gelatine (mainly bovine hide gelatine) can't be processed to prepare feed for food producing animals (EFFPA, 2016). The ban is disproportionate to the feed safety risk (OIE, 2017) and EFFPA therefore proposes lifting the current ban on **edible ruminant gelatine for non-ruminant** farmed animals by amending Annex IV, Section II of the TSE Regulation (EC) No 999/2001).

Competition by anaerobic digestion

More research is needed to understand the quantities of FFs that go to AD. However, there is anecdotal evidence of **AD syphoning surplus food that is suitable for human redistribution and/or animal feed down the food use hierarchy** (Schneider and Scherhauser 2009). This distortion of the hierarchy can be ascribed to the feed barriers discussed above, combined with a strong demand for feedstock from AD plants that began with subsidies and pay food businesses for food waste (see also chapter 4.8).

Draft amendments on the EU Waste Framework Directive prepared by Simon Bonafe look at introducing more sophisticated organic waste collection infrastructure, tracing and separation for AD. These measures are key for an eventual repurposing of this waste to animal feed but, as currently written, further entrench the biogas industry at the expense of animal feed. One solution is to **fine-tune amendments to clarify that where organic waste streams are permissible as animal feed, they should be recycled as such** (e.g. surplus from vegetarian sandwich and ready-meal manufacturers with no prohibited ABPs on the premises).

As it becomes easier and more profitable to send FFs to feed, authorities and policymakers must ensure demand for FFs for feed does not incentivise wasteful behaviour, and guard against animal feed competing for food that can be redistributed to humans.

Reviewing the ban on meat-containing waste streams for omnivores

Impact: If the EU were to authorise the feeding of heat-treated meat-containing surplus food to omnivorous non-ruminants such as pigs and chickens, and this heat-treated EU food waste was processed into animal feed at rates similar to Japan and South Korea, 39.2 % of total food waste across all sectors could be recycled into feed (zu Ermgassen et al. 2016, 45). Furthermore, “the land requirement of EU pork could shrink by 1.8 million hectares. This represents a **21.5 % reduction in the current land use of large-scale EU pork production**” (zu Ermgassen et al. 2016, 37). Currently **permissible former foodstuffs, however, only have an estimated potential of reducing land use for feed crops by 1.2 %** (zu Ermgassen et al. 2016, 37). Feeding meat-containing surplus to pigs also could “reduce demand for up to 268,000 hectares of soybean production, which could “mitigate ca. 2.6 % of the forecast expansion of soybean, reducing pressure on high-biodiversity tropical biomes accordingly” (zu Ermgassen et al. 2016, 37).

In addition to the environmental impacts, there are also expected economic benefits. In December 2015, **feed costs in 7 EU pig producing countries made up between 56 % and 69 % of total production costs** (AHDB 2017; Luyckx 2016a). In **Japan and South Korea**, however, industrial food-to-feed recycling plants deliver safe **waste-based feed at 40-60 % of the cost of conventional feed** (zu Ermgassen et al. 2016). In the United States heat-treated meat-containing surplus food is also fed to pigs. The practice is common in Las Vegas where large buffet-style restaurants and pig farms incorporate leftovers in their business model (Semley 2017).⁴¹ The US has been Foot and Mouth Disease (“FMD”) free since 1929 (National Cattlemen’s Beef Association 2017) and there has been no outbreak linked to the use of catering and retail waste in Japan (zu Ermgassen et al. 2016).

Opportunities for development: The 2001 Foot and Mouth epidemic in the UK shows the critical importance of robust legislation and its effective enforcement. In 2016, the UK’s Animal and Plant Health Agency (APHA) released their study on the risks of feeding food waste to non-ruminants (Adkin et al. 2016). The study confirms the **effectiveness of heat-treatment to inactivate dangerous pathogens in meat-containing surplus food**, but points to the **risks from potential errors in transport, storage or manufacturing that could allow for the re-introduction of pathogens through cross-contamination between treated and untreated product.** Wageningen microbiological risk experts are further assessing the risks of cross-contamination to propose risk management measures. **Japanese legislation on the prevention of Transmissible Spongiform Encephalopathies (TSEs) and the use of food waste in animal feed can help inform EU policy recommendations.**⁴²

The Japanese and US models do not have an intra-species recycling ban for non-ruminants. The EC Scientific Steering Committee (EC SSC) (1999) acknowledges that intra-species recycling used to be common practice in farm animals, especially pigs, poultry and fish. It is known that opportunistic cannibalism of deceased

⁴¹ For more information see the Harvard guide on feeding Leftovers to Livestock (Broad Leib et al. 2016)..

⁴² See Annex for a summary of the Japanese legislation. Further research is needed to fully document enforcement and government risk assessment and management strategies in Japan and South-Korea.

animals is commonplace in wild boar. **The EC SSC also states that “no scientific evidence exists to demonstrate the natural occurrence of TSEs in farmed pigs, poultry and fish, which may create a basis for an intra-species progression of a TSE infection due to intra-species recycling”** (EC SSC 1999, Art. 3.4.A). Chickens and pigs have never had prion disease, the only way researchers have made it happen in experiments is through injection in the brain (Wells et al. 2003) which cannot take place outside a laboratory. Given that the EC SCC opinion on intra-species recycling is 18 years old, it is important that a new scientific opinion is established. **A new opinion would need to re-assess the risk considering any new evidence, leaving risk-managers to discern how the precautionary principle should be applied to maximally reduce feed safety risks while considering the food security and climate risks associated with not feeding all possible surplus food to non-ruminants.**

4.5 Agriculture and rural development

4.5.1 Overview

The EU’s Common Agricultural Policy (CAP) is the policy framework under which European farmers operate. The CAP is a shared responsibility of the European Union and its Member States and defines requirements and instruments for farming, rural development and environmental requirements as well as controlling EU agricultural markets, e.g. through the Common Market Organisation and marketing standards. It is the single largest common policy within the European Union (EU). First introduced in 1962, the CAP’s primary aim was to ensure a stable supply of affordable food by encouraging improved agricultural productivity. By the 1980s the CAP had eliminated post-war food shortages but also resulted in surpluses of major agricultural commodities. Since 1992 there have been frequent reforms of the CAP away from a system of market supports to a system of direct payments to farmers and a greater emphasis on the environmental dimension. By moving away from product support to producer support, the overproduction of the earlier years was effectively reduced, which “probably contributed to reduce food waste” (ECA 2016).

The Agenda 2000 established two pillars within the CAP, which remain the core of its structure until the current period⁴³ (2014-2020). The first pillar (accounting for 72 % of the CAP spending (Buckwell et al. 2017)) provides direct payments to farmers and measures to regulate agricultural markets such as intervention refunds. The second pillar supports rural development and agri-environmental measures of the Member States more broadly. A major reform of the CAP in 2003 linked direct payments to the fulfillment of environmental, food safety and animal welfare standards, called compulsory cross-compliance.

For the upcoming programming period after 2020, the debate about needed CAP reforms focuses on the question of how the CAP can better respond to societal and environmental demands. In this context, the EU Commission started a public consultation in spring 2017 about the simplification and modernisation of the CAP.

⁴³ The instruments of the current period (2014-2020) are presented in the chapter “impacts and opportunities” below.

In its Communication "Future of Food and Farming" published in November 2017 the Commission did not consider food waste as a major issue, but acknowledges that the **CAP can help to better reduce food waste and food losses**. It can do so by "stimulating better production and processing practices (e.g. promoting new technologies that extend the shelf life of perishable products or better matching supply and demand through increased transparency) and by supporting initiatives that transform traditional produce-use-discard consumption patterns into a circular bio-economy" (EC 2017).

However, in the context of the development of the EP resolution on Food Waste and Food Safety (2016/2223(INI)) the Committee on Agriculture and Rural Development submitted an opinion for consideration by the responsible Committee on the Environment, Public Health and Food Safety to incorporate a number of suggestions into its motion for a resolution. The opinion points to a number of required changes within EU agricultural policies, but also mentions policy outside of the agricultural sector that still affects food waste and food losses in the agricultural sector.

In general, **the scope of instruments within agricultural policies with a current and potential impact on food waste prevention, reduction and reuse is large**. The most relevant are discussed below. It needs to be noted though, that the **room for improvement very much depends on the general development of the CAP reform**. Options range from an incremental approach to the next CAP reform that further develops certain instruments and requirements but remains the familiar general structure. Others demand a more fundamental change in the relationship between the objectives of agricultural policy and the way that these are pursued, as advocated by many scientists and civil society organisations, e.g. in the frequently discussed report of the RISE foundation (Buckwell et al. 2017) or the call from Birdlife Europe and Central Asia (2017) to replace the CAP by a European Food and Land policy (BirdLife International 2017) (see also chapter 4.1). In December 2017 the European Academies' Science Advisory Council argued that EU agricultural policy should adopt an integrative food systems approach and states that the "EU needs more policy coherence and a higher level of political ambition in order to tackle climate change and decrease food waste" (EASAC 2017).

When it comes to the inclusion of **food waste reduction** in the CAP however, the Commission is also concerned that this objective **is not covered by the objectives of the CAP** as laid down in the Treaty of Rome (Article 39 TFEU). According to the treaty the five targets are: to increase agricultural productivity, ensure a fair standard of living for farmers, stabilise markets, ensure the availability of supplies and to ensure reasonable prices for consumers. This concern is e.g. issued in the EU Commission's response to the criticism of the ECA report on EU food Waste policy. Here the Commission stated, that "the fight against food waste is not among the objectives of the CAP as defined in Art. 39 of TFEU" and therefore does not accept the recommendation 2(a) of the ECA report to include the topic of food waste in the forthcoming review of the CAP (ECA 2016, 46), even though they state that they will "consider" food losses and food waste in its work for the preparation of the CAP (ECA 2016, 68). However, others challenge this concern, arguing that a) the Treaty of Rome wording is extremely flexible and b) that a

number of other treaty provisions lay down other objectives which are applicable to all EU policies and therefore also the CAP. These are e.g. measures promoting environmental protection and sustainable development (Article 11) (Massot 2017).

Another argument used by the EU Commission in its reply to the ECA (2016) report with regard to food waste in agriculture is that "Agriculture primary production only generates limited food losses which is a fully different issue than food waste (as covered by the waste framework directive). Food waste is mainly concentrated on the rest of the food supply chain including processing, retail and consumption". It therefore needs to be differentiated between losses and waste. However, while the FAO uses the term "food losses"⁴⁴ there is no such definition in the EU (see demand for a definition stated in the EP resolution on food waste in 2016 (European Parliament 2016b)). **It can be questioned if a differentiation between "food losses" and "food waste" is useful⁴⁵, given that in both cases (losses and waste) food is not available in the food chain.** It also needs to be noted that the question of definitions of food losses and food waste, along with the question what can or not be avoided and how to measure this is ongoing both at the international as well as on the EU level⁴⁶. As by December 2017, the SDG indicator for target 12.3 was still a so called "tier III" indicator, meaning that "no internationally established methodology or standards are yet available for the indicator" (UNSTATS 2017).

To conclude, depending on this overall structure, improvements may or may not need to be adapted to current instruments. Moreover, the reform of the CAP depends on the budget envelope for the CAP which will be agreed for the post 2020 Multi-annual financial framework. If CAP funding is reduced in the coming period, the debate on focus spending areas will be even more intense.

4.5.2 Impacts and opportunities for improvement

The EU Common Agricultural Policy is an important factor in how farmers are taking decisions about their food production. With an approximate spending of 52 billion Euro in 2016 it takes up about 40 % of the EU budget (European Commission 2017a) and covers a large area (as approx. half of the EU land area is managed by farmers). There are a number of instruments that have a likely impact on the prevention, reduction and reuse of food waste as presented below. However, so far **the EU Commission has not yet undertaken any studies on the impact of the CAP and its reforms (including decoupling of payments from production to producers) on the generation of food waste** (ECA 2016), so little is known about the exact correlation of the design of certain

⁴⁴ According to the FAO presentation of Fabi (Fabi 2017) at the EU Food Loss and Waste Platform on November 7, 2017 food losses refer to On-farm Post-harvest/slaughter operations, on-farm Post-harvest/slaughter operations, Processing & Packaging and Transport Storage Distribution.

⁴⁵ Therefore, the legal definition of "waste" according to the Waste Framework Directive may not be the appropriate guidance to tackle the EU's problem of surplus food, food losses and food wastes.

⁴⁶ At the EU Food Loss and Waste Platform in November 2017 Carola Fabi from the FAO presented the working approach to differentiate between food losses and food waste. She also mentioned the lack of shared and internationally agreed concepts and definitions, as well as the lack of international guidelines on how to define and collect postharvest losses and waste data (Fabi 2017).

instruments and their impact on food losses and food waste. Further research in the effects of agricultural instruments is therefore needed.

Marketing standards

EU Regulation 1308/2013 “on the single common market organisation”⁴⁷ establishes rules for the common organisation of agricultural markets. It streamlines, expands and simplifies the current provisions on public intervention, private storage, exceptional or emergency measures and aid to specific sectors, and sets out rules for cooperation through producer and inter-branch organisations.

It also sets marketing standards for a range of products (e.g. fruits and vegetables, eggs, pigmeat, beef, milk, bananas etc.).

Marketing standards set – among other requirements – conditions for shape, mass and aesthetic quality of products, in order to (among other reasons) “take into account the expectations of consumers” (Article 75). The specific requirements are laid down in implementing regulations. As fruits and vegetables are products that are likely to be affected the most, when it comes to requirements that lead to food waste due to their natural differences, implementing Regulation No 543/2013 for fruit and vegetables can be used to illustrate the requirements. Requirements can be very specific, e.g. with regard to apples: These must be “clean, practically free of any visible foreign matter”, are classified according minimum surface colour characteristics, size and shape of bruising and defects (for which some tolerances are allowed), are required to have a minimum size (60 mm, if measured by diameter or 90 g, if measured by mass), and need to be uniform within their package (and contain only apples of the same origin, variety, quality and size).

This example demonstrates that **the standards for marketing are very demanding and are likely to cause food waste or at least barriers in marketing for products that do not conform the marketing standards and/or requirements of supermarkets for a certain “extra class”/class 1 etc. only.**

However, certain products, such as products “intended for processing” or “for animal feed”, “ready to eat” products, certain nuts and products directly sold by the producer to the final consumer for personal use are not required to conform to the marketing standards, according to the Regulation.

As marketing standards are also set on international level (UNECE agricultural quality standards) and since Reg. 1308/2013 makes reference to “relevant

⁴⁷ “A common market organisation is a set of measures that enables the European Union to monitor and manage, either directly or indirectly (via producer organisations supported by operational programmes), the markets of agricultural products. The rules are laid down in the regulation on the single common market organisation. The purpose of market management is to stabilise markets (in terms of quantity offered and purchased and the price at which transactions take place) and thus to ensure, on the one hand, that farmers do not suffer from excessively low prices and, on the other, that consumers have a secure supply of food at reasonable prices.” (European Commission 2017: Agriculture glossary http://ec.europa.eu/agriculture/glossary/single-common-market-organisation_en_en)

international standards” EU policy can also try to influence these standards, which are also currently under discussion in order to reduce food waste.

Market interventions

Market intervention measures (public intervention, private storage, market withdrawals, green harvesting and non-harvesting) represent a small and decreasing proportion of the CAP budget (ECA 2016). These measures are used to support the removal of (future) supplies that are surplus to demand when prices become weak. The products may either be stored until the market price increases and then returned to the market for sale, export or donation, or may be disposed of in another way (e.g. destroyed). If market interventions lead to the disposal of food, they directly contribute to food losses and waste (ECA 2016), even if products bought into public intervention or stored with the benefit of a storage aid must be stored in such a way that their quality is maintained (EU Commission response in ECA 2016, p.61). However, market measures have an impact on the food use hierarchy and its suboptimal use in the case of green harvesting, non-harvesting. According to ECA (2016) between 2008 and 2015, 1.8 million tonnes of fruit and vegetables were withdrawn from the EU market⁴⁸ and over 45 500 ha of land in the EU were harvested before maturity or have not been harvested. According to the Commission’s figures, 66% of the products withdrawn were wasted (ECA 2016). In the EU Commission’s response to the ECA report, the (only) product that is in intervention as of 2016 is skimmed milk powder⁴⁹. However, the amount of withdrawn fruits and vegetables represents only a fraction (0.002 % between 2008 and 2015) of the production (EU Commission response in ECA 2016, p.62). It also needs to be noted that market measures can only be used as a safety net when there is a severe crisis affecting the market and are designed to prevent misuse⁵⁰ (EU Commission response in ECA 2016, p.61).

There is however the **possibility to make products bought under public intervention available for the scheme for food distribution to the deprived**⁵¹ in the Union to a certain price (see Article 16 of the EC Regulation “on the single common market organisation” 1308/2013). This opportunity is however not fully used (e.g. due to a lack of distribution channels and resources for delivery) as stated in the opinion of the European Parliament’s opinion on food waste strategies (EP AGRI 2017).

⁴⁸ The Commission notes that 1.8 million tonnes represents about 0.002 % of the production between 2008 and 2015 (EU Commission response in ECA 2016, p.62)

⁴⁹ Intervention buying has started in 2015 and continued in 2016 in response to declining prices in the milk sector (EU Commission response in ECA 2016, p.66)

⁵⁰ The level of support is such that it would be preferable for producers to sell their products on the market rather than withdrawing. The quantities that may be withdrawn are limited. Withdrawal of products provides for specific use of the withdrawn products (e.g. in favour of charities or schools).

⁵¹ See also Article 23 of Regulation 223/2014 on the Fund for European Aid to the Most Deprived (FEAD). The Commission also points out that Member State operational programmes can be modified by Member States to better facilitate food donation (EU Commissions response to the ECA 2016 report , p. 66)

Surpluses can occur due to the natural fluctuations inherent in agricultural production. **But given the unprecise objectives⁵² and requirements for market intervention there is also the risk that support is offered not only during immediate crises but for structural overproduction and hence contributes to food waste** (ECA 2016).

Rural Development Measures

The European Agricultural Fund for Rural Development (EAFRD), i.e. the second pillar of the CAP, has the potential to contribute to reducing food waste through the integration of food waste measures in the MS Rural Development programs (see below).

However, according to the European Court of Auditors (ECA 2016) the Commission has not specifically encouraged Member States to use EAFRD funds to combat food waste, and the Member States audited did not specifically refer to combating food waste as a need or objective of their programmes for 2007-2013 and 2014-2020. According to the EU Commission this is due to the fact, that combating food waste is not a specific objective of rural development policy, therefore Member States were not required to specifically include it in their strategies (Commission response to ECA 2016). Nevertheless, several of the Member State authorities visited during the ECA audit recognised the potential of the EAFRD to contribute to reducing food waste (ECA 2016). Hence, there is room for improvement to better exploit the EAFRD's potential to reduce food waste. Member States also have the flexibility to shift financial resources between CAP pillars within thresholds and can hence strengthen the second pillar and food waste measures, if they wish to do so.

There are a number of rural development measures (articles 14, 15, 17, 18, 27, 33, 35, 36 in the EU Regulation 1305/2013 on support for rural development by the EAFRD) that can be used to improve food losses and waste reduction:

- **Investment in infrastructure/physical assets:** improvement of storage/cooling capacities and facilities, transportation infrastructure, equipment that is less damaging to crops, technologies to convert surplus/damaged products into processed goods, use of digitalisation to better trace food products and match supply and demand, etc.
- **Farm advisory services:** e.g. advising farmers on regionally demanded crops with supply shortages, e.g. advice on food waste reduction measures, management of co- and by-products, harvest timing, suitable techniques and equipment; advice in the choice of crop varieties (that are e.g. drought resistant and therefore reduce yield losses due to drought (Tangermann 2011 cited in Buckwell et al. 2017)). Also the FAO "Toolkit reducing the food wastage footprint" (FAO 2013) points out that "food losses can be significantly reduced simply through training farmers in best practices".

⁵² Objectives according to SEC(2011) 1153 final/2 of 20.10.2011 'Impact Assessment Common Agricultural Policy towards 2020', Annex 5 Market Measures, p. 12.: 1) continued market orientation and (2) a safety net for farmers in case of strong market disruptions (cited in ECA 2016)

- **Knowledge transfer and information actions** (e.g. on best practices). In this context not only article 14 describes possible measures, Article 53 demands that a **European Innovation Partnership** (EIP) network shall be put in place to support the EIP for agricultural productivity and sustainability. European Innovation Partnerships (EIPs) are a new approach to EU research and innovation. In the description of the tasks of the EIP network, Article 53(3) mentions to 'reduce post-harvest losses and food wastage'. It remains the only article of the rural development regulation that refers explicitly to the reduction of food waste an objective.
- **Setting -up of producer groups and organisations:** e.g. to enable access to secondary markets/alternative uses of food surplus as suggested in the EP AGRI opinion (2017). Also the FAO (2013) points out that "joining farmers together in cooperatives or professional associations can help to greatly reduce food losses by increasing their understanding of the market, enabling more efficient planning, enabling economies of scale and improving their ability to market what they produce".
- Consideration of food waste reduction measures in the **business start up aid** for farmers
- Promote **community led social innovation projects** to distribute surplus food to those in need (EP AGRI 2017)
- **Animal welfare measures** that reduce the mortality of animals e.g. through adapted animal housing to reduce sickness and mortality and/ or improve hygiene conditions that can again contribute to a reduction of volumes of milk wastes, due to fewer cows with mastitis.
- Consideration of use of food losses in the **risk management** against adverse climatic events, animal or plant diseases, pest infestation, environmental incidents etc.

Coupled payments

Despite the fact that the majority of direct payments no longer directly supports the production of a specific product, there is still a limited proportion of EU direct payments (according to ECA 2016 around 6 % in 2014) that is still linked to production. Through "Voluntary coupled support" (a scheme available since 2015), most Member States have increased their share of coupled support of their direct payments. The most important sectors receiving coupled payments are: beef (41 % of the total); milk (20 %); sheep and goats (12 %) and protein crops (11 %) (ECA 2016). **As coupled payments stimulate the production of specific products for which there is a risk that demand does not exist, they may stimulate food waste production.** However, no EU study has been carried out specifically on the issue of potential food waste linked to direct payments that would allow a quantification of potential food waste.

Other instruments

Beyond the above mentioned there are also other entry points for food waste reduction.

- Under the **EU School Milk Scheme and the EU School Fruit Scheme**, the EU subsidises the cost of various milk products and fruits distributed to children in schools. Both schemes provide for accompanying measures, with the measures being mandatory for the fruit scheme and optional for the milk scheme. According to the current regulation, the accompanying measures for both schemes 'may include information on measures for education about (...) combating food wastage' (Articles 23(2) and 26(2) of Regulation (EU) No 1308/2013). However, in MS practice these accompanying measures have hardly been used (ECA 2016).
- Food losses and wastes occurring on farm level can in many cases be used by farmers, be it for soil improvement, energy production or used as feed. In order to increase the resource efficiency of these uses and improve the environmental performance the establishment of a **comprehensive food use hierarchy in EU legislation** with a clear focus on source prevention, and only then use for the human diet, then feedstuffs for animals, then composting and anaerobic decomposition may be supportive for agricultural food waste reduction and its optimal valorisation. This is explored in more detail in chapter 4.2. However, the Waste Framework Directive is not applicable for farm losses as these streams of surplus food are not defined in the WFD. They should be tackled though in some way even if not from a legal perspective but a resource perspective.
- not only rural development plan requirements for **animal welfare** can reduce the mortality of animals, but also animal transport requirements, control of epidemics etc.
- The agricultural committee of the European Parliaments notes that the **price volatility on agricultural markets** can result in food waste and "that appropriate tools to address price volatility therefore need to be built into the CAP" (EP AGRI 2017).
- The EPs agricultural committee (EP AGRI 2017) notes that "food wastage at the production stage can also stem from the deterioration of our agricultural production base resulting from the **degradation of land, biodiversity** (reduced pollination) and natural resources of all kinds, and that due account needs to be taken of this in the future development of farming and the CAP."
- Given the little amount of **data available** in the primary sector about food losses and waste (e.g. estimations about food lost in natural disasters, not harvested crops, reduction due to pests etc.) this may prevent an accurate assessment of the overall scale of food waste in Europe (EP AGRI 2017). The lack of an agreed upon definition further complicates this issue (e.g. whether/how inedible food waste and agricultural losses are counted).
- While an **Impact Assessment** for all new policies with regard to their effects on food waste is demanded by many actors (European Court of Auditors, EP resolution against food waste in 2017, FUSIONS final policy recommendations) it will be particularly needed for policy proposals for the CAP reform, given the high leverage, budget and food production potential that this policy has.

- Addressing **unfair trading practices** (see chapter 4.7) can contribute to lower food waste and stabilize prices. The EPs agricultural committee “notes that unfair trade practices and price dumping in the food sector result in food often being sold at below its real value, thus contributing to more wastage, and that a ban on selling at below the production price is urgently needed, partly in order to raise consumers’ awareness of the true value of food”.
- Finally, the **clarification of the interpretation of legal provisions for donation** and **clarity of rules of the VAT directive** (EP AGRI 2017) might improve the reuse of surplus food produced in the agricultural sector. It also points out that “the EU provides funding to facilitate the donation of food, including under the Fund for European Aid to the Most Deprived (**FEAD**), which is used, inter alia, to finance storage and transport facilities for food aid organizations” but “takes the view that Member States do not make sufficient use of the opportunities on offer in this area” (EP AGRI 2017).

4.6 Fisheries policy

4.6.1 Overview

The Common Fisheries Policy⁵³ (CFP) is the main policy regulating fisheries in the EU. The CFP sets rules for “the conservation of marine biological resources and the management of fisheries targeting them. In addition, it includes, in relation to market measures and financial measures in support of its objectives, fresh water biological resources and aquaculture activities, as well as the processing and marketing of fishery and aquaculture products” (European Council 2013). This analysis covers fisheries policy developments up until January 2018.

One of the goals of the CFP is to “ensure that fishing and aquaculture activities are environmentally sustainable in the long-term and are managed in a way that is consistent with the objectives of achieving economic, social and employment benefits, and of contributing to the availability of food supplies” (EU Regulation 1380/2013, Article 2). **The CFP establishes the guiding principles for fisheries management for European waters and EU fleets fishing on the high seas:**

- **Though there is a large body of knowledge about fisheries resources and impacts of fisheries on marine environments, there is still a large knowledge gap. In the absence of this knowledge, the EU follows a precautionary approach for fisheries management.**
- **Fisheries management is oriented towards achievement of maximum sustainable yield (MSY).**

⁵³ Regulation (EU) No 1380/2013 Of The European Parliament and of the Council Of 11 December 2013 on the Common Fisheries Policy, amending Council Regulations (EC) No 1954/2003 and (EC) No 1224/2009 and repealing Council Regulations (EC) No 2371/2002 and (EC) No 639/2004 and Council Decision 2004/585/EC

- **An ecosystem-based fisheries management approach is targeted to ensure negative impacts of fishing on the marine environment are minimized.**

Another key feature of the CFP is the setting of Total Allowable Catches (TACs) for commercial fish stocks. Also known as quotas or fishing opportunities, TACs determine how much of a species can be harvested from a certain stock. They are set by the EU and MS at the EU Council of Ministers based on scientific recommendations by the International Council for the Exploration of the Sea (ICES) and other scientific bodies⁵⁴. These bodies give their recommendations for MSY for each stock. However, quotas are often not set in line with scientific recommendations (Carpenter and Kleinjans 2015; Veitch, Luk, and Tacconi 2015). Quotas are updated once a year or once every two years depending on the species. They are distributed by MS to fishing operations. Once a yearly quota for a fishery is reached, the fishery must be closed to prevent over-exploitation of the stock.

Unwanted catches, bycatch and discards are the main food waste issue in fisheries. Definitions and usage of the terms vary, but are used to refer to catches of non-target species, catches which are unused, and/or catches which are returned to the sea either dead or alive. The CFP uses the term discards and defines it as “catches that are returned to the sea” (Regulation No 1380/2013, Article 4.1.10). **Reasons boats discard include** (European Commission 2016e):

- **that caught fish are undersized**
- **there is low market demand for the caught species**
- **the fishing operation has no quota for the species**
- **or because of catch composition rules.**

Before the introduction of the landing obligation (explored below), there was no incentive for fishers to take up valuable storage space on their vessels for catches of low commercial value to them.

Estimates of bycatch and discards vary immensely. **The FAO's most recent estimate of fishery bycatch and discards puts the global average discard rate at 8 % of total catch (Kelleher 2005).**⁵⁵ **Other estimates, however, are significantly higher. A study by Davies et al. (2009) estimates global bycatch rates at about 40.4 % of catches.** Variations in statistics reflect differing definitions (e.g. the FAO definition of discards includes all unused catch, but bycatch refers only to non-target species, whereas in the Davies study bycatch refers to all unused or unmanaged catch), and different information sources and assumptions applied to interpret data.

Generating reliable statistics about fishery catches and discards is challenging giving the poor state of data (FUSIONS 2016). There is evidence that official reported catch statistics may underestimate global catches by as much

⁵⁴ E.g. the International Commission for the Conservation of Atlantic Tunas (ICATT) and the General Fisheries Commission for the Mediterranean (GFCM)

⁵⁵ A third edition of the FAO's global assessment of fishery bycatch and discards is slated for publication in 2017.

as 30 % (Pala 2016). In the EU, landings and discard estimates exist going back to 2000.

Discarding and Mandatory Landings

The part of the CFP with the highest direct relevance for food waste are the regulations of discards and the establishment of a Landing Obligation (LO).

Because of the high level of discard rates in fisheries, the 2013 reform of the CFP introduced a Landing Obligation for commercial fish species. The LO is to be implemented progressively between 2015 and 2019. **The LO means that discards of regulated fish are prohibited and that the entire catch of regulated fish must be brought to land and counted towards the operation's quota.** This includes all fish species regulated by Total Allowable Catches (TACs, also called quotas), or in the Mediterranean by minimum size requirements. Non-regulated species and species with high survival rates after discarding are exempted from the discard ban (Borges 2016). Undersized fish cannot be brought to market for direct human consumption, and prohibited fish must be recorded but returned to the sea. There is also a *de minimis* exemption that allows discards in cases where there are difficulties in increasing selectivity or disproportionate costs of handling unwanted catches. It does not apply to fish species that are not regulated.

The goal of the landing obligation is to stop discards in fisheries, reducing unwanted catch and fishing mortality. With the landing obligation in place, vessels are no longer allowed to discard commercially uninteresting fish if it is a regulated species. **Many commercial stocks feature moderate to high discard rates, so in order to use limited space on board and quotas efficiently, in the long-term vessels are likely to switch to technologies that allow them to avoid harvesting commercially uninteresting fish in the first place** (Borges 2016). Additionally, in the short-term the landing obligation forces the opportunity for unwanted catches to be brought to market, rather than discarded at sea. Provisions exist to prevent the development of markets for undersized fish – see below in this chapter for more detail.

The landing obligation began with pelagic fish species (i.e. fish that live in open waters away from the sea floor and shore) in 2015. It is being progressively extended to cover all species regulated by TACs or minimum size requirements. Full implementation is expected in 2019. It applies to all fishing operations in European waters and European vessels in the high seas (European Commission 2016e). The gradual introduction is intended to increase acceptance of and compliance with the significant change to catch recording system and the technological changes that are expected with the roll-out (i.e. switch to more selective equipment).

Provisions for the phasing in of landing obligations (species covered, provisions on catch documentation) and exceptions are based on joint recommendations by regional groups of MS and are split into fisheries and regions. These are evaluated by the STECF. Following a positive evaluation, these provisions are then transformed into temporary discard plans with a maximum duration of 3 years.

Following this phase, they will be incorporated into Multi-Annual Plans (European Commission 2016e). Multi-Annual Plans are the means of managing most important fisheries and contain fish stock management goals and sometimes detailed roadmaps for achieving this objective.

Financing for fisheries: European Maritime and Fisheries Fund

The European Maritime and Fisheries Fund (EMFF) is the major financing tool supporting the implementation of the CFP. The fund totals 6,396.6 million EUR from 2014-2020. Just under half of the fund is dedicated to promoting sustainable fisheries and aquaculture. Support for proper implementation of the CFP (i.e. data collection, control and enforcement) makes up another large part of the fund, and a small part is dedicated to supporting an integrated maritime policy. Most measures are aimed at operators of fisheries or aquaculture, and many are also open to public bodies and scientists. Certain measures can be applied for by other bodies, such as NGOs, producer organisations, or advisory councils. The fund excludes some investments such as those that would increase overall fishing capacity (EPRS 2017).

In relation to food waste, the EMFF can cover investments that help compliance with the LO, such as investments in more selective fishing equipment, cold storage facilities for landed discards, processing of fish for industrial uses, or improved monitoring and enforcement measures.

4.6.2 Impacts and opportunities for improvement

Impact of the landing obligation

After the first two years, it is possible to evaluate the initial effects of the landing obligation. Some empirical case studies and models indicate that the LOs can lead to a decrease in discard rates, in some cases even without negative economic impacts (Prellezo, Carmona, and García 2016; Mortensen et al. 2017). **There is therefore evidence that the LO is useful for reducing food waste in fisheries.**

There is however room for improvement in the *implementation* of the policy. Due to lax enforcement, exceptions, and increased quotas, it is difficult to say whether LOs are having a large-scale impact on the reduction of fisheries' food waste. As detailed below, some of these are strategic decisions to increase buy-in, prevent drastic economic impacts to fisheries, and make efficient use of limited resources. In the long-term, this approach can support the LO's success, yet these decisions do have an impact on food waste reduction potential which warrants attention. Considering the impact of the current implementation approach allows us to a) make an assessment of current impact respecting the challenges of the starting point, b) demonstrate that the food waste reduction potential of the LO could be even higher, and thereby c) provide evidence of the benefits of a more rigorous implementation in the long-term.

Quotas and minimum size requirements were increased to support buy-in by fishing operations, in order to offset the impact of having the use vessel

capacity to land species of lower commercial interest (Borges 2016). In the Baltic, minimum size requirements for cod were reduced to minimum conservation reference size (38 to 35 cm), which meant fewer cod was discarded for being too small but catches of small cod increased (MRAG 2016 in Borges 2016). This indicates that as the total amount of fish harvested increases, the absolute amount of discards may also increase if discard rates do not simultaneously decrease.

There is evidence that the enforcement of LOs is low and inconsistent (Borges 2016; Fitzpatrick et al. 2017). Full enforcement of the ban was postponed from 2015 to 2017 to give fishing operations time to adjust. In addition, MS show different interpretations of landing obligations (e.g. on technical measures and reporting obligations).

Finally, **differences in the reported discard rates between sources (e.g. the European Fisheries Control Agency and MS reported catches) has increased since the introduction of the discard ban, which indicates that the status of data on discards could be worsening** (Borges 2016). The European Court of Auditors also found that European data on discards was currently insufficient for reliably monitoring the LO (ECA 2016). **This further complicates the evaluation and enforcement of the discard ban, yet could be improved by fully implementing measures such as electronic logbooks and encouraging sharing of data on discards between MS and the Commission** (ECA 2016).

Limitations on the use of discards

Another challenge from a food waste perspective is the limitations on the use of some landed discards. Catches of undersized fish are not allowed to be sold for direct human consumption, but instead can only be used as animal feed or processed into other products (e.g. cosmetics). These markets usually bring lower commercial value than for human consumption. The idea behind this limitation is to minimize the economic incentive for selling regulated fish which are not yet mature enough to be caught.

This limitation does not apply to all landed discards, but only to undersized regulated fish. The limitation is important from a fisheries management and conservation perspective – if markets were to develop for undersized fish, the survival of a population could be at risk, and fishers will no longer have incentives to invest in appropriate selective harvesting technologies. However, this means that use of these landed discards in ways that are more desirable according to the food use hierarchy are prohibited.

Improving monitoring of waste in fisheries

In the EU and globally, transparency and accuracy of fisheries data is a major barrier to the sustainable management of fisheries (EEA 2016). There is currently insufficient data on fisheries in the EU to accurately assess the amount of food waste they generate (FUSIONS 2016). Data on discards is also often patchy and based on small sample sizes (DG MARE 2016). **This can be overcome through improved monitoring systems.**

The European Parliament own-initiative Resolution “Resource efficiency: reducing food waste, improving food safety” of May 16th 2017⁵⁶ calls for a study by the European Commission on the impact of reforms of the Common Agriculture Policy (CAP) and the Common Fisheries Policy (CFP) on the generation and reduction of food waste (EP Resolution 2016/2223(INI), Article 113).

The EMFF already provides financial support for MS to improve monitoring capacities, yet is not being used to its full potential. MS have to submit operational plans detailing their plans to spend EMFF funds to the European Commission for approval (European Commission 2016f). The Commission could use this process to place more emphasis on these types of investments.

Improving controls and enforcement of the CFP

Effective controls of fisheries policy are necessary to ensure sustainable exploitation of fisheries resources, including avoidance of wasting activities in fisheries (e.g. use of inappropriate harvesting technologies, discarding). The Control Regulation of the CFP⁵⁷ establishes a control and enforcement system for the CFP.

However, the European Court of Auditors’ 2017 evaluation of the Control Regulation found that the regulation was not being implemented by MS, concluding that **the EU “did not yet have a sufficiently effective system for fisheries controls in place to support the success of the CFP”** (ECA 2017, 7). In the four MS investigated in the report, none had sufficiently verified the capacity (tonnage and engine power) of their fishing fleets. As a result of exemptions provided by the Control Regulation, 89 % of the fleet was not monitored by satellite-based tracking systems, despite the fact that these present a powerful and useful tool for monitoring fisheries management. Additionally, catch data was not accurately or reliably recorded, with discrepancies found between paper-based declarations by vessels and the national databases of MS, and inconsistencies between declared landings and declarations of first sale.

In addition to recommendations to MS, the ECA report included recommendations to improve the Control Regulation of the CFP by:

- **Including more detailed regulations on documentation of fishing capacity**
- **Removal of exemptions to Vessel Monitoring Systems (satellite-based tracking) for small vessels**
- **Establishing an information exchange platform with standardized data and formats for recording fisheries data, promotion of a**

⁵⁶ “Resource efficiency: reducing food waste, improving food safety” European Parliament resolution of 16 May 2017 on initiative on resource efficiency: reducing food waste, improving food safety (2016/2223(INI))

⁵⁷ Council Regulation (EC) No 1224/2009 of 20 November 2009 establishing a Community control system for ensuring compliance with the rules of the common fisheries policy, amending Regulations (EC) No 847/96, (EC) No 2371/2002, (EC) No 811/2004, (EC) No 768/2005, (EC) No 2115/2005, (EC) No 2166/2005, (EC) No 388/2006, (EC) No 509/2007, (EC) No 676/2007, (EC) No 1098/2007, (EC) No 1300/2008, (EC) No 1342/2008 and repealing Regulations (EEC) No 2847/93, (EC) No 1627/94 and (EC) No 1966/2006

cheaper and more user-friendly reporting system, and removal of exemptions to electronic reporting for small vessels

- **Requiring more detailed catch data reporting (fishing area, vessel size, gear)**
- **Making use of the electronic inspection reporting system mandatory for MS to ensure completeness and facilitate data exchange**
- **Including provisions for a system for exchanging data on infringements and sanctions**

Stakeholders in the Mediterranean expressed concern that ineffective monitoring in the case of LOs could not only lead to a lack of compliance with the obligation, but could also lead to a black market for undersized fish, incentivising unsustainable catches (Fitzpatrick et al. 2017). **In order to improve the food waste impacts of the CFP, enforcement of sustainable fisheries management as foreseen in EU fisheries policy is a necessary prerequisite.**

Improving the impact of the landing obligation: reducing raised quotas, reducing exemptions

As LOs have been rolled out, TACs⁵⁸ have also been raised to temporarily compensate for the reduced share of high-value species in catches. Although landings of discards have increased, total catch has also increased (Borges 2016). This indicates that **the increase in quotas is offsetting the potential positive impact of the LOs. In order for the LOs to have the intended impact, quotas should be returned to lower levels in line with MSY.**

There is also concern among stakeholders in the Mediterranean that MS may be focusing more on exemptions to the LO rather than encouraging their full implementation (Fitzpatrick et al. 2017). This weakens the potential of the LOs to reduce fishery food waste.

The European Parliament remarked in resolution 2016/2223(INI) that **because the LOs do not apply to all fish, further measures beyond LOs will also be necessary to reduce discards.**

Incentivising use of landed discards for bait and fishmeal

There is potential for landed discards to be used in the bait and fishmeal industry. Catches with low demand for direct human consumption could provide an efficient and sustainable supply of material for these fisheries products (de Rozarieux 2015). **Though prevention of unwanted catches should be the first priority, when prevention is not possible, using discards is still preferable to non-use (according to the food use hierarchy). There is potential to make more use of existing opportunities through the EMFF to finance investments to increase the use of landed discards for this purpose.** Given that the long-

⁵⁸ ICES now provides advice on catches and not landings, and the increase in TACs is based on the transition between these two approaches. TACs are set in line with the assumption that all catches will be landed.

term goal of the LO is to reduce unwanted catches, these investments should target only the processing of landed discards which can not be avoided (e.g. before more selective fishing techniques can be implemented, or when fishing techniques cannot be 100% selective), and prevention should be given the highest priority.

Improving the use of the EMFF to reduce discards and increase capacity to handle landed discards

One of the central recommendations of the European Parliament in Resolution “Resource efficiency: reducing food waste, improving food safety” (2016/2223(INI)) encouraged MS to “harness the full potential of the European Fisheries Fund (EFF) and the European Maritime and Fisheries Fund (EMFF) in order to reduce food waste from fish discards and improve survival rates of aquaculture-grown organisms” (Article 117). **These could include investments in measures such as selective fishing gear, equipment for dealing with unwanted catches on board, research concerning survival rates of fish, and investments for processing discards on shore** (ECA 2016).

The implementation of the EMFF was delayed due to late agreement on the 2014-2020 Multi-annual Financial Framework (MFF) and on the EMFF regulatory framework, which has led to a delay in the use of the fund. As of February 2017, only 2.1 % of the total EU and MS allocations were decided (EPRS 2017).

The ex-post review of the 2007-2013 European Fisheries Fund (EFF) – the precursor to the EMFF – found that investments through the EFF in more selective and efficient fishing gear lead to reduced discards in participating vessels (DG MARE 2016). This demonstrates that investments through such programmes can have an effect on reducing food waste associated with fisheries.

Currently the limited capacity to store and process landed discards is a major barrier for the implementation of LOs, especially for smaller ports (Fitzpatrick et al. 2017; de Rozarieux 2015). As mentioned above, use of the EMFF to invest in facilities to store and process landed discards could also reduce the waste associated with these catches.

Currently some MS have used the EMFF to facilitate the implementation of the landing obligation, but the potential of the Fund is not yet being used to full capacity (ECA 2016). MS should therefore be encouraged to fully implement their allocations under the EMFF, and to target allocations towards waste-reducing investments, e.g. through the review process by the Commission of MSs’ EMFF operational plans.

4.7 Unfair Trading practices

4.7.1 Overview

Unfair Trading Practices are defined by the European Commission and the European Parliament as “practices that deviate grossly from good commercial conduct and are contrary to good faith and fair dealing and are unilaterally imposed by one trading partner on another” (European Commission 2016d, 2). UTPs’ primary impact is commercial, in that they may result

in one trading party losing money or commercial influence. However, UTPs may also have a range of collateral impacts. The European Parliament's June 2016 resolution on unfair trading practices in the food supply chain (2015/2065(INI)) states in article L that UTPs may result in overproduction and food waste. In addition, power imbalances which do not directly qualify as UTPs may also result in food waste. More detail on the link between trading practices and food waste is provided in the impact section below.

The response to UTPs across EU28 food supply chains has so far been fragmented, with MS pursuing different approaches and with the Commission now considering a more comprehensive approach at European level⁵⁹. There is no EU legislation targeting business-to-business UTPs across the food supply chain (European Commission 2016d). EU competition law, within the scope of Article 102 of the Treaty on the Functioning of the EU, addresses abuses of a dominant position and anti-competitive practices, but most reported UTPs do not fall under competition law, because most actors are in a strong, but not dominant position. Instead, UTPs emerge from imbalances in contractual power, which go beyond the concept of dominance in antitrust (Renda et al. 2014). The Commission's response to date has come through the EU High Level Forum for a Better Functioning Food Supply Chain⁶⁰ which fostered the set up of a voluntary code of conduct to help eliminate unfair business-to-business practices in the food supply chain. This resulted in the creation of the Supply Chain Initiative (SCI) – the first EU-wide voluntary initiative to combat UTPs – started in conjunction with eight EU-level associations in the food area.⁶¹ The SCI aims “to promote fair business practices in the food supply chain as a basis for commercial dealings” (Supply Chain Initiative n.d.) and is structured around two guiding documents, the ‘Principles of good practice in vertical relationships in the food supply chain’ and a voluntary framework to implement and enforce these principles. The High Level Forum continues under a new legal basis, established in June 2015, and chaired by Commissioner Bieńkowska, together with Commissioners Hogan and Andriukaitis.

Additionally an independent Agricultural Market Task Force established by the European Commission published a report recommending that the EU should “introduce a harmonized baseline of prohibited UTPs [unfair trading practices] in member states” (European Commission 2016g) as well as framework legislation (Agricultural Markets Task Force 2016).

No single MS has yet developed a comprehensive approach to grocery supply chain UTPs, some adapting existing mechanisms for dispute resolution, such as through Chambers of Commerce, others setting up regulatory approaches with limited coverage of different supply chain interactions where UTPs may occur. A major obstacle to progress on UTPs

⁵⁹ https://ec.europa.eu/commission/commissioners/2014-2019/hogan/announcements/speech-fsai-conference-safeguarding-food-chain-6th-october-2017-dublin-castle_en

⁶⁰ The Forum was first established in 2010, replacing the High Level Group on the Competitiveness of the Agro-Food Industry and comprises ministerial-level representatives from MS national authorities responsible for the food sector, together with representatives from agro-food industry organisations, and NGOs.

⁶¹ For more information, see <http://www.supplychaininitiative.eu/>

is the 'fear factor' that discourages suppliers from bringing forward complaints about current trading practices. At MS level, out of the 20 Member States that already have legislation, 15 have introduced it in the last 5 years. A report on the legal framework regarding UTPs for DG Internal Market (Renda et al. 2014) found that in the food sector in Denmark, Ireland, Luxembourg, Malta, the Netherlands, Sweden, Belgium, and Estonia, there is no coverage of selected UTPs through public legislation. In Poland, Finland, Bulgaria and Slovenia, coverage is quite limited. Italy (which covers all eleven selected UTPs), Croatia, France, the United Kingdom, Portugal, Spain and the Czech Republic feature a comprehensive coverage of the selected UTPs. Some MS have expanded national competition law beyond the scope of EU antitrust rules by adopting rules on abuse of economic dependence, expanded the role of competition authorities or, other, *ad hoc* enforcement bodies⁶² (Renda et al. 2014), and/or launched market investigations on the retail sector or more specific sectors (e.g. food). Many MS feature a mix of public and private regulation. Criticisms raised over the past decades in the case of public regulation include the insufficiency of competition law, lengthy proceedings and legal uncertainty, coupled with problems of access to justice and concern among suppliers about losing business for speaking out. At the same time, the lack of institutional strength and legitimacy, coupled with limited enforcement and sometimes insufficient transparency have led legislators to consider private regulation and voluntary initiatives with a degree of distrust (Renda et al. 2014).

A more involved approach to addressing UTPs in the grocery supply chain has been started in some countries, using a regulatory approach and an ability to levy significant fines where breaches of good practice occur. A new approach is emerging, which entails public enforcement and supervision of private regulation. A key example is the UK Grocery Code Adjudicator Act (GCA) which imposes legally binding obligations on the UK's ten largest supermarket retailers with an annual £1 billion turnover⁶³. If a supplier has a dispute, the GCA will adjudicate between a named retailer and a named supplier. The UK GCA can initiate investigations where they believe the Groceries Supply Code of Practice (GSCOP) has been breached, and is able to apply dissuasive penalties both financial and non-financial, for example by requiring retailers to publish information about the retailer's breach of GSCOP. The cost of the GCA's operation is paid for by the retailers to which of the GCA applies. In 2016, the GCA carried out an investigation of the trading practices of Tesco Plc, one the UK's largest supermarket chains, which resulted in a large amount of publicity and Tesco Plc committing to implementing a series of changes to internal practices.⁶⁴ The impact of GSCOP is partly limited by the resources available to investigate cases that come forward, although the high level of potential fines that can be imposed on breaches to the

⁶² Expanded role for competition authorities: Austria, Germany, Hungary, Italy, Latvia and Lithuania. Expansion of competition law: Austria, Cyprus, Germany, Hungary, Portugal and Romania.

⁶³ "In France, the CEPC recently issued a recommendation to establish a code of good practice in the retail sector, including key principles such as fair access to information, respect of intellectual property (IP) rights and innovation, and rules regarding form of contracts. ... In Spain, the recent Law n. 12 of 2 August 2013 calls for the creation of an observatory on the food sector, which in turn will be tasked with the elaboration of a Code of Practice." (Renda et al 2014, p. 98)

⁶⁴ The UK Grocery Code Adjudicator Act came into force on 25 June 2013, formally establishing the role of the Grocery Code Adjudicator (the "Adjudicator"). The Adjudicator oversees the implementation and enforcement of the Grocery Supply Code of Practice ("GSCOP") which came into force in February 2010.

Code of Practice can act more widely as a deterrent across the grocery sector. The Code only applies to direct suppliers to the 10 big grocery retailers and does not apply to trading that involves intermediaries. The GCA's current overall staffing is also a limiting factor, with the GCA working only part time.

4.7.2 Impact of UTPs on food waste and opportunities for improvement

Food waste is a side-effect of particular types of UTPs and addressing the systemic issue within the European grocery supply chain will be an opportunity to address both the commercial losses incurred by suppliers and food waste.

Contract-related overproduction, order modifications and cancellations.

A recent report on food waste by the European Court of Auditors (ECA) described two ways in which trading practices and market structures can cause food waste (ECA 2016). The first is through an imbalance of bargaining power between two parties (which is generally a precondition for a UTP to occur, though not the same thing). For example, a contractual clause which stipulates the requirement for a high level of product availability, without guaranteeing purchase, which may lead to overproduction. The second way food waste can occur is directly through an unfair practice, which takes place in the context of imbalanced power relations between parties. For example, in the case of an absence of a written contract, or a unilateral modification of agreed terms and conditions by the stronger party, food waste may occur when an order is cancelled or changed at the last minute. Colbert (2017) has also found that intermediary actors in the supply chain tend to shift the risks and losses resulting from UTPs of their buyer (e.g. retailer) upstream in the supply chain. In this way, intermediary actors may become both victims and perpetrators of UTPs, and the producers of fresh produce bear most of the financial losses and food waste.

Cosmetic specifications

In research with primary producers, exporters, importers and other supply chain intermediaries, Colbert (2017)⁶⁵ and Colbert and Stuart (2015)⁶⁶ found that: (a) cosmetic specifications are being used to restrict market access when demand is lower than supply; (b) retailers do sell lower grade produce to consumers when high-quality supply is not available, demonstrating that consumers are not the only driver for cosmetically 'imperfect' fruit and vegetables being rejected and; (c) when pre-arranged contractual supply to supermarkets does not match consumer

⁶⁵ Colbert's research is based on survey data from 141 UK-based supply chain stakeholders (including primary producers, produce inspectors, insurers, academics, importers, exporters and others), and semi-structured face-to-face or phone interviews with 70 of these. Thirty four (34) Peruvian and Senegalese primary producers, and two producer associations were visited and participated in semi-structured interviews. Twelve (12) formal interviews were conducted in the fresh produce area of a major European port, all of whom requested the name of the port or even country would not be disclosed. Information was also provided by 10 South African primary producers. See Colbert 2017, p. 9 Methodology Section for more details.

⁶⁶ Colbert and Stuart (2015) carried out primary research in Kenya: 21 interviews were conducted, of which ten were with farmers, two were with day labourers and nine were with exporters. More detail on p. 8 of the report

demand, cosmetic standards are applied more stringently as part of a business response to the excess supply. There is evidence that cosmetic specifications are used to evade penalisation in countries where legislation against unfair trading practices exists, as well as getting around more general contract law. The research has also found contractual clauses prohibiting the supplier from finding a secondary buyer for produce that is rejected due to cosmetic specifications.

Minimum Life on Receipt criteria

Unnecessarily strict MLOR criteria may be used as an excuse to reject produce that the buyer has decided it cannot sell (because of falling demand or inaccurate forecasting). Colbert (2017) found reports of fresh produce deliveries turned away for missing their 'window' by as little as 5 minutes, then when redelivered at a rebooked slot, are rejected for exceeding their MLOR criteria (Colbert 2017). Retail distribution and stock managers report the arbitrary application of MLOR criteria to respond to commercial drivers and bonus incentives when managing stock (Colbert 2017).

Supply risk in relation to food waste and surplus

Over-production, over-supply and the share of risk within the grocery supply chain follows from the power imbalances between retailers and suppliers described by the ECA report (2016), with the weaker partner often accepting more or all of the risk.

Burgos et al. (2017) point out that "within the identification of these systemic drivers, the responsibility of the surplus or waste is a key issue. In other words, which actor owns the food loss, surplus, or waste at which stage? ... Unclear responsibilities lead to stress on the value chain and lead to higher risk for food waste generation". Suppliers manage the risks related to these unclear responsibilities, cosmetic specifications, and order modifications and cancellations, through systematic overproduction (European Parliament 2016a, Article L). More research is needed to quantify to what extent normalized overproduction is part of the supplier business model and thereby masks waste. Such research needs to bear in mind that concern among primary producers and manufacturers about losing business may prevent them from speaking out (Groceries Code Adjudicator 2016; European Parliament 2016a, Articles U and X). As part of REFRESH, the Center for Agro-food Economy and Development (CREDA) is conducting research into food waste and UTPs in the peach and nectarine supply chain. Although Spain has a Food Chain Law,⁶⁷ this climate of concern is a significant factor, especially amongst smaller producers. Initial findings indicate that UTPs are especially prevalent in years with high overproduction, as is the case in 2017. There will be an opportunity to compare the outcomes of this research with similar research in the US currently being conducted by WWF, the Global Cold Chain Alliance and University of California⁶⁸.

⁶⁷ established in 2013 with a small enforcement agency- AICA – Food Information and Control Agency

⁶⁸ For more information see <https://www.worldwildlife.org/press-releases/wwf-ffar-and-walmart-foundation-team-up-with-producers-to-study-food-rescue-opportunities-on-farms>

Improving the role of government regulation

The EP resolution on UTPs regrets that steps taken by the Commission so far have been insufficient to combat UTPs and finds that the effectiveness of the SCI is undermined by a broad range of short-comings, in particular a lack of effective deterrents and engagement with SMEs and farmers, who in general find the SCI inadequate (European Parliament 2016a, Articles 4 and 17). The EP identifies lack of a mechanism for confidential and anonymous complaints, independent investigations into alleged wrong-doing and meaningful sanctions as a key weakness of the SCI (European Parliament 2016a, Article 21):

"The SCI and other national and voluntary systems ... should be developed further and promoted as an addition to effective and robust enforcement mechanisms at MS level, ensuring that complaints can be lodged anonymously and establishing dissuasive penalties ... Investigatory and sanctioning powers need to be granted to independent national enforcement bodies, for which the UK's Groceries Code Adjudicator is signaled as a model and for which we need more consistency across MS and more cooperation to address cross-border challenges" (European Parliament 2016a, Articles 18 and 41).

The EP "believes that framework legislation is necessary" (European Parliament 2016a, Article 36) and has invited the Commission to submit "proposals for an EU-level framework laying down general principles and taking account of national circumstances and best practices to tackle UTPs in the entire food supply chain to ensure a level playing-field across MS that will enable markets to operate as they should" (European Parliament 2016a, Article 31). The report for DG Internal market by Renda et al. (2014) also emphasizes the need for government regulation in addition to voluntary mechanisms and private regulation.

In regulating UTPs in the food supply chain, the Commission has identified five key elements that are needed for an effective framework (European Commission 2016). We discuss the five elements here in reference to the UK GCA which have been identified by the European Parliament as "a possible model to follow at EU level" (European Parliament 2016a, Article 19):

- **Coverage across the entire food supply chain:** In order to tackle food waste that occurs from manufacturers and intermediary suppliers shifting the risks upstream in the supply chain, it is crucial that an effective legal mechanism can be accessed by all suppliers in the food supply chain, whatever their geographical origin⁶⁹, not just direct suppliers to retail as currently is the case for the UK GCA.
- **Coverage of four key categories of UTP** (shifting of costs/risks to the other party, unilateral contract changes, unfair termination or threat of termination of the contract, unreasonable demands for advantages or benefits without performing a related service): To prevent UTPs causing waste, it is important that legal loopholes around cosmetic standards and MLOR criteria are tightened so that arbitrary application of these standards

⁶⁹ See also Stefanelli and Marsden (2012)

and criteria are considered when discerning whether a trading practice is unfair.

- **Balancing flexibility and rigidity when defining UTPs:** a flexible general approach that defines UTPs on a case-by-case basis helps to ensure all kinds of imbalances and newly emerging UTPs throughout the supply chain are captured, but can be cumbersome in its application. Legislation that has a list of predefined UTPs can be easier to enforce, but may miss cases as it cannot take due account of the economic and contractual context or a contract or practice. Finding a balance between the two in legislation would support its effectiveness.
- **Confidentiality of complaints and own-initiative investigations to address suppliers' fear of losing business:** The UK GCA has pointed to this concern as a severe limitation in its ability to investigate and address UTPs (Groceries Code Adjudicator 2016).
- **Deterrent effect:** So far, the UK GCA has not used its powers to impose financial penalties on any retailers. However, to act as a real deterrent, penalties should be high enough to outweigh any gain from imposing the UTP and to influence behaviour at company level. While the threat of public disclosure of UTPs has an important role to play, financial penalties calculated as a percentage of the annual turnover of the company that applied UTPs against its weaker business partner may be a useful approach in some cases.

Interaction between UTPs and effectiveness of Voluntary Agreements:

Primary producers and suppliers are usually underrepresented in Voluntary Agreements, whilst at the same time being the actors within the supply chain that are most affected by UTPs. Although research has not been conducted into the barriers to VA participation within the early stages of the food supply chain, addressing UTP issues is likely to improve participation. This in turn is likely to unlock greater opportunities for whole supply chain collaboration in addressing food waste.

Achieving greater transparency in supply chain food waste reporting

While more quantitative data and research is needed to understand the volume of food waste resulting from UTPs, **the lack of data linked to particular UTPs and food waste is symptomatic of the nature of UTPs and the reluctance of those affected to share data on the impacts.** the EP resolution notes that "since 2009, it has adopted five resolutions on problems in the EU retail chain, including three specifically on imbalances and abuses within the food supply chain; further notes that during the same period the Commission has produced three communications and a Green Paper, and has commissioned two final reports on similar subjects; declares, therefore, that **yet more analysis on the state of the food supply chain will merely delay the pressing need for action to help farmers fight unfair trading practices.**" (European Parliament 2016a, Article 46, emphasis added).

The EP resolution also highlights the importance of transparency and consumer information, to enable consumers to make informed choices about products. One

important aspect of transparency which could contribute to reduced incentives on the part of major food retailers to engage in UTPs, could be the regular, independently audited and publicly available publication of food waste occurrence throughout their supply chain. This may additionally help to resolve to some degree the issue of attribution of responsibility for food waste at different stages of the supply chain identified in 4.7.2.

In October 2017 Agriculture Commissioner Hogan announced plans to draft UTP legislation, following the recommendations of the Agriculture Markets Taskforce and the Commission's Impact Assessment on UTPs where "a clear majority of Member States which is in favour of an EU approach, as is a majority of farmers, processors and NGOs" (Hogan 2017). A consultation exercise has been conducted feeding into an Impact Assessment. On April 12, 2018 the European Commission published a proposal for a directive on unfair trading practices in business to - business relationships in the food supply chain (COM(2018) 173 final).

The sectors that are most vocal on the issue of UTPs have been those most affected by such practices. Industry positions and policies on the subject have been less visible. However, once legislation is introduced, the engagement process is often considered constructive, as evidenced by retailer responses to the GCA in the UK.

4.8 Bioenergy

4.8.1 Overview

The use of food waste for energy generation (be it for incineration, anaerobic digestion or liquid biofuel production) is part of the sustainability-oriented European policies, especially overall waste management and energy policies. The latter includes the energy transition, encompassing energy efficiency, energy security and also the reduction of carbon emissions through the increase of renewable energy.

Overall management of food waste for energy is caught at an interface, as the major policy areas affecting waste-to-energy and material recovery in anaerobic digestion are geared towards different purposes. These include the circular economy, creating a bioeconomy⁷⁰, reducing resource consumption, and decarbonisation, while developing renewable energy and strengthening energy security (Kampman et al. 2016) (see also chapter 4.2).

The trade-off between the diverse objectives has largely indirect rather than direct impacts on food waste management. However, there are regulations and directives that specifically target waste which are presented and detailed further below.

The different interrelated policies presented below create the framework supporting food waste valorisation through bioenergy (mainly the Renewable Energy Directive 2009/28/EC). However, the energy-related incentives tend to deprioritise food waste within the waste hierarchy. These incentives are directly competing with the use for animal feed and to a lesser extent food donation and prevention.

⁷⁰ As stated in section 3.2, bioeconomy strategies are not a focus of this report and this topic has intentionally been left out of this section's scope.

Consequently, the impact on food waste prevention and reduction is very likely to be negative, as the cost incentives to reduce and prevent may not be sufficient to counteract the economic appeal of valorising these waste streams as an energy source. However, choosing easiest treatment ways is looking at the problem from the wrong angle since long-term perspective prevention is economically more favourable than biological and thermal treatment.

Waste-to-energy in EU legislation on waste management

The comprehensive definition used by the Commission for waste-to-energy includes:

- 1) co-incineration of waste in combustion plants (e.g. power plants) and in cement and lime production
- 2) waste incineration in dedicated facilities
- 3) anaerobic digestion of biodegradable waste
- 4) production of waste-derived solid, liquid or gaseous fuels
- 5) other processes including indirect incineration following a pyrolysis or gasification step (European Commission 2017b).

Out of these, three main valorisation streams currently stand out in particular as viable routes for **food waste** management:

- **Energy recovery from co-incineration**, which involves using waste as a complementary alternative fuel in combustion plants in order to generate energy.
- **Anaerobic digestion (AD)**, which involves the contained breakdown of biodegradable waste by microorganisms in a tank without oxygen. This process produces a gaseous fuel and a digestate, allowing for both energy and material recovery. The gas is indeed used for heat or electricity production, and the digestate can be turned into fertilizer.
- **Liquid biofuel production**: second generation biofuels are produced through the reuse of bio-waste. The use of food materials coming from crop dedicated to energy applications is not considered as food waste.

Waste hierarchies and food waste

Article 7 of the Waste Framework Directive (WFD) (European Parliament 2009) presents a waste hierarchy and states that "re-use and material recycling should be preferred to energy recovery from waste, where and insofar as they are the best ecological options". The conditional element of the provision is important, as it potentially gives EU Member States room for manoeuvre, effectively allowing recovery streams to overtake recycling streams in order of priority as long as the primary objective of delivering "the best environmental outcome" is being fulfilled. Nevertheless, according to article 4(2) of the WFD, an alteration to the priority order must be justified through a life-cycle analysis and consideration of environmental protection principles.

The European Parliament proposed to formally adopt a hierarchy dedicated to food waste based on the model of the generic hierarchy. **Fehler! Verweisquelle konnte nicht gefunden werden.**¹ presents the REFRESH team's proposal for a food use hierarchy further specifying the waste hierarchy as defined in the Waste Framework Directive (WFD). It should be noted that while at this stage, this hierarchy does not extensively consider all technical, environmental, economic and legal impacts, it is in line with the WFD's waste hierarchy, adapted for food.

As indicated in the European Parliament's resolution, the three bioenergy streams (energy recovery from incineration, AD, and biofuels) are valorisation options that fall further down the waste hierarchy, and should come after food waste prevention, food redistribution for human consumption and use for animal feed (European Parliament 2008).

Overall, anaerobic digestion would be prioritised relative to the other streams listed above, according to waste management objectives within the Waste Framework Directive (European Parliament 2008). Yet because of its multiple outputs (fuel and fertilizer), how AD is considered in the hierarchy is inconsistent. AD can be categorised under recycling because of the material recovery aspect. However, it is also sometimes categorised as food waste recovery, disregarding the material output (see e.g. Papargyropoulou et al. 2014).

As part of the Circular Economy Package and Bioeconomy Strategy, the proposal for "rules on the making available on the market of CE marked fertilising products and amending Regulations (EC) No 1069/2009 and (EC) No 1107/2009" (European Commission 2016c) aims to encourage the production of fertilizer through AD. The main policy objective of the proposal is to incentivise fertilizer production in the EU from domestic organic or secondary raw materials. Some Member States have also taken measures to support the development of AD for fertilizer production. For example, in 2013 France launched the EMAA plan (*Énergie Méthanisation Autonomie Azote*, i.e. Energy Anaerobic Digestion Autonomy Nitrogen) aimed at farmers. One of the goals of the plan is to reduce the use of mineral nitrogen and to increase fertiliser production autonomy through anaerobic digestion. The plan does not include direct incentives, but rather tools to support the establishment of facilities (Ministere de l'agriculture de l'alimentation 2013).

Animal by-product policies relating to bioenergy

Animal by-products (ABPs) account for significant amounts of food waste – around 15% (REFED 2016). Specific legislation governs the management of ABPs, which impacts their potential for use in AD. According to Regulation EC No. 1069/2009, ABPs can be divided into three categories with regard to their sanitary hazards. Animal by-products of categories 1, 2 and 3 can be incinerated, co-incinerated, used as fuel for combustion and in specific cases placed in authorized landfills (European Parliament 2009).

However, unlike categories 2 and 3, animal by-products of category 1 cannot be processed in anaerobic digestion plants. This is because they present the highest risk of contamination by prion particles which may cause diseases like transmissible spongiform encephalopathies (European Parliament 2009). Legally the only

treatment option for category 1 animal by-products is currently incineration (with or without energy recovery).

Regulations EC No 1069/2009 and EU No 142/2011 define the requirements of the transformation of animal by-products and derived products into biogas and composting. The legislative burden and risk associated with interpreting the legislation may encourage incineration – with or without energy recovery – over anaerobic digestion. In addition, the export of animal by-products and derived products for use in a biogas or composting plant to non-OECD member countries is prohibited (European Parliament 2009a).

For batches of by-products of different categories, the classification of the whole batch is equal to that of the most hazardous product within the batch. Waste separation is therefore important for indicating whether the products in question can be processed in AD plants.

Given current legislation on ABPs, the most preferable option is to divert food waste streams containing ABPs towards AD and not towards landfill or incineration, since it is considered as recycling and not recovery/disposal according to the hierarchy.

Waste-to-energy in EU Energy policies

EU energy policy sets incentives for the use of food waste (as bio-waste) for energy production under the Renewable Energy Directive (European Parliament 2009). It should be noted that the European Commission presented a proposal for a recast of this directive, but since it is not yet approved, the mentioned objectives refer to the current version of the legislation. The Renewable Energy Directive endorsed a mandatory target of 20% for the share of energy from renewable sources in overall Community energy consumption by 2020 but also:

- A mandatory 10% minimum target for energy from renewable source in transport to be achieved by all Member States. Amongst these 10%, only 7% can come from first generation of biofuels.
- A mandatory 10% minimum target for the percentage of biofuels in transport petrol and diesel consumption⁷¹

The Renewable Energy Directive (2009/28/EC) sets ambitious objectives for Europe regarding the proportion of renewable energy in the energy mix or in transport. According to the definition set in Article 2, organic waste – which includes food waste – is considered a renewable source of energy. Therefore, **the use of food waste in the energy mix, through AD, liquid biofuels or incineration, is a way to fulfil the targets set in the Renewable Energy Directive.**

Regarding the specific case of liquid biofuels (mainly bioethanol and biodiesel), the majority is synthesised respectively from grains and sugar beet derivatives & rapeseed oil, palm oil and used cooking oil (USDA Foreign Agricultural Service 2016).

⁷¹ Article (9) of the Renewable Energy Directive

The Renewable Energy Directive clarifies the use of liquid biofuels, especially regarding the sustainability criteria they have to meet. In order to ensure the measuring compliance with the European / national renewable energy targets and to be eligible for financial support, biofuels and bioliquids are to respect five criteria:

- The GHG emissions saving from the use of biofuels and bioliquids had to be at least 35% before 2017, at least 50 % from 1 January 2017 and will have to be at least 60 % after 1 January 2018.
- They shall not be made from raw material obtained from land with high biodiversity value (e.g. primary forest)
- They shall not be made from raw material obtained from land with high carbon stock (e.g. wetlands)
- They shall not be made from raw material obtained from land that was peatland in January 2008 (unless specific cases)
- They shall be obtained in accordance with certain agricultural standards⁷².

Moreover, annex IX of the Renewable Energy Directive defines the feedstock and fuels whose contribution towards the share of energy from renewable sources in transport is considered as the double of their energy content. Amongst these special feedstock and fuels, notably there is the biomass fraction of municipal waste of categories 1 and 2 animal fats. The indirect use of food waste is consequently a convenient way to meet the objectives set by the Directive.

Other instruments: financial incentives and support schemes

The Cohesion Policy funds & the European Fund for Strategic Investment are market support mechanisms that complement the policies outlines above.

At the MS level, financial incentives for biomass recovery exist but vary between countries. Research shows that the different support schemes in place such as the feed-in tariff, premium tariff, tenders, quota system, net metering, investment grants, loan, and tax regulation can have an impact on food waste (Kampman, et al. 2016). The incentives are set up to encourage the production of energy from biomass, and therefore from food waste. These schemes incentivize the food waste to AD stream relative to other streams:

- a) Food waste dedicated to animal feed. In the case food waste is diverted to AD instead of feed, the waste would be pushed down to a less preferable option.
- b) Food waste dedicated to incineration without energy recovery and/or landfill: in this case, AD is the more preferable option according to the hierarchy.

⁷² Namely requirements and standards under the provisions referred to under the heading 'Environment' in part A and in point 9 of Annex II to Council Regulation (EC) No 73/2009 of 19 January 2009 establishing common rules for direct support schemes for farmers under the common agricultural policy and establishing certain support schemes for farmers (22) and in accordance with the minimum requirements for good agricultural and environmental condition defined pursuant to Article 6(1) of that Regulation

These schemes are usually part of national renewable energy action plans. For example, the feed-in tariff support schemes in the UK (the Renewables Obligation) encourages licensed electricity suppliers in the UK to source an increasing proportion of electricity from renewable sources, including biogas from AD (National Renewable Energy Action Plan for the UK, 2010). Other EU MS have established similar schemes in order to achieve their national mandatory targets. Regarding financial resources for research and development, the Renewable Energy Directive states that “Member States may encourage the use of biofuels which give additional benefits” (e.g. biofuels made from waste) but also that member states may also encourage investment in research and development for renewable energy technologies that need time to become competitive. This means that the use of biomass as a viable source of energy is expected to be a long-term solution. As part of this research, it could also be relevant to focus on the dependency of AD facilities once they operate and reach a situation where they only function with non-avoidable by-products.

At the EU level, several funding opportunities exist for farmers to enhance their renewable energy production via the setup of biogas plants. For example, within the framework of the European Regional Development Fund, the “Operational Programme Quality of Environment” of Slovakia allocates grants to support the shift to a Low Carbon Economy in all sectors. This enabled, for example, the replacement of boilers in biomass plants (Kampman et al. 2016). The European Agricultural Fund for Rural Development (EAFRD) encourages farmers across the EU to set up biogas plants in the framework of the Common Agricultural Policy. The European Investment Bank (EIB) can also support member state investments, especially for biogas infrastructures (Dorvil 2017).

Like anaerobic digestion (AD), biomass incineration is encouraged at the European level. The national renewable energy actions plans (NREAP) which are developed by each MS detail the path that they chose to follow in order to meet its obligations under the Renewable Energy Directive. The following are a few MS examples of information included within these NREAP⁷³:

- Belgium indicates that tax deduction applies for production of energy from waste incineration (as for wind energy or AD);
- Bulgaria engages to implement its infrastructure for biomass incineration to facilitate higher conversion levels;
- Germany considers the biogenic share of incineration municipal waste as renewable energy while Spain deems 50% of the total MW as renewable energy.

⁷³ An overview of the NREAP is presented at the website of the EU Commission, accessible under <https://ec.europa.eu/energy/en/topics/renewable-energy/national-action-plans>

4.8.2 Impacts and opportunities for improvement

There is little literature available comparing the environmental and economic impacts of the different food waste management options outlined in the WFD waste hierarchy.⁷⁴ A recent study on the potential benefits of diverting food waste for pig feed in the UK showed that the processing of food waste as a wet and dry pig feed has less environmental impact than the two most widespread UK disposal technologies: AD and composting (Salemdeeb et al. 2017).

The analysis of energy-related policies shows that, despite the provisions of the WFD which clearly favour waste prevention and re-use (use for human consumption, animal feed) over recycling and recovery (AD), **the current policies at the EU and Member State level incentivise food waste-to-energy**. Even if the direct impacts on food waste cannot be precisely quantified, it is **detrimental to the establishment of more sustainable food systems**.

The first observation is that energy production via **waste incineration, including bio-waste and by association, food waste, is still incentivised** in Europe. This incentive acts as a barrier towards recovering bio-waste/food waste through more preferable routes (see Figure 1). It could therefore make sense to reconsider incentivising recovery through incineration, which is one of the least preferable options.

It is clear that the policies outlined above have contributed to the development of secondary markets for food waste that are less favourable than redistribution or use in animal feed. **The AD industry has developed significantly as a result of EU policy concerning energy and waste management over the past two decades (see Figure 4 below)**.

To ensure food waste prevention efforts take priority over AD, a food use hierarchy (see chapter 4.2) should be taken into consideration when designing how EU energy policies incentivise AD and other forms of valorisation. **Incentives for AD of food waste could be limited to only of non-edible food waste** that is otherwise destined for landfill, and not any food waste that could be reused or valorised in ways higher up the hierarchy (Feedback 2016). A revision of the EU ban on feeding catering waste to non-ruminant livestock could also help push food waste up the hierarchy from AD to animal feed (see chapter 4.4).

Well-developed infrastructure and policy incentives for AD currently make it more economically interesting for producers and waste managers to recover food waste via AD rather than send it to animal feed, other re-use alternatives or simply prevent it in the first place. However, the stability of a market based on fiscal incentives can be questioned. Farmers and industries which have or will set up AD facilities strongly rely on incentives to run their business and would feel the burden if these incentives were reduced without any other form of compensation. Since the food loses value as it goes down the hierarchy, it seems that an **approach**

⁷⁴ Life Cycle Analysis research within the REFRESH project will provide further evidence on the environmental and economic impacts of different food waste management options by 2019.

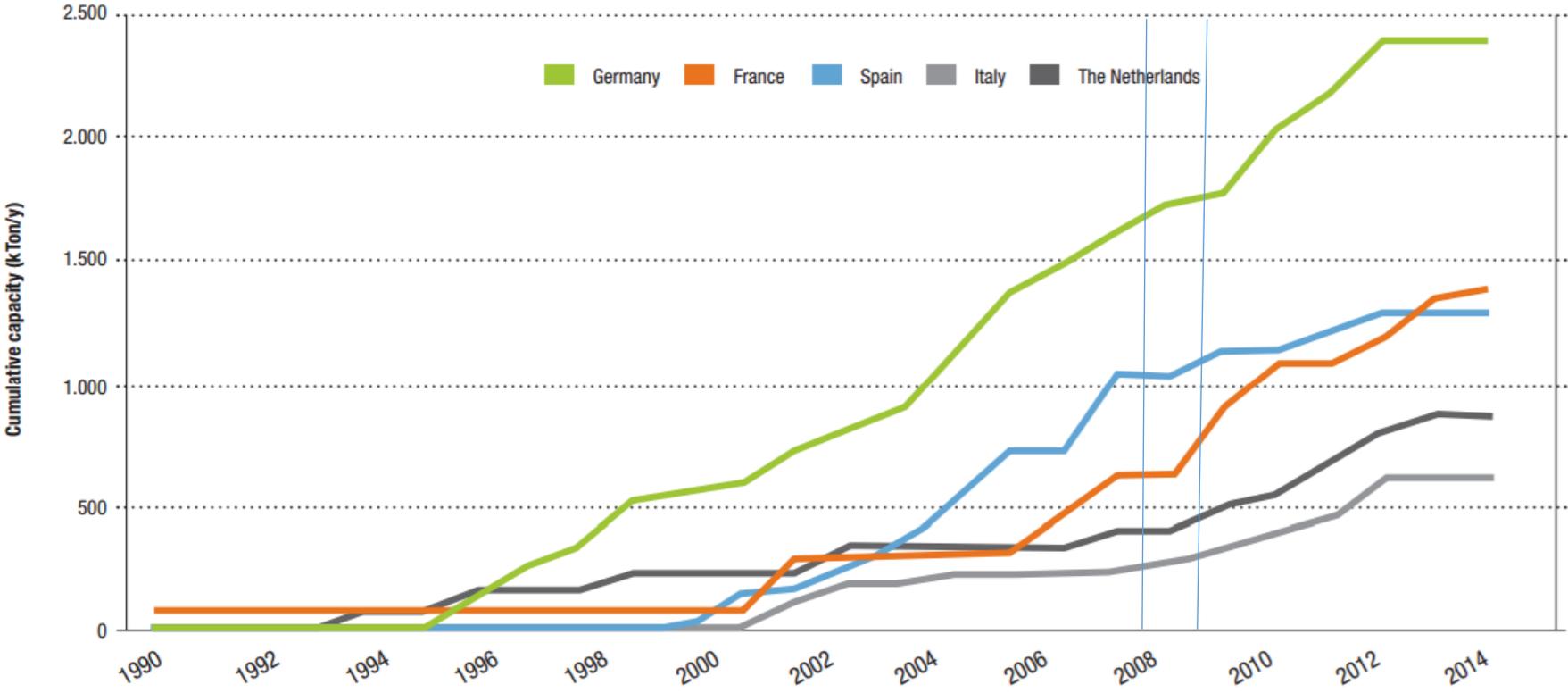
based on prevention and not on incentivisation of valorisation as energy is more efficient.

As mentioned above, many of the incentive schemes for the use of bio-waste (including food waste) in AD are at the MS level. Opportunities exist at the EU level to reverse the current trend and influence MS to shift their incentives from AD towards bio-waste prevention or recovery. For example, a proposal for amendments to the WFD from January 2017 included **targets for municipal bio-waste recycling**. It is in preparation but a consensus has not been reached yet (ENDSEurope 2017).

In different articles of the latest version of the renewable energy directive, it is mentioned that **MS shall have due regards to the principles of the waste hierarchy**. A great opportunity of improvement for the second version of the directive currently in discussion – RED II – could be to ensure that there are **strong guidelines for generation of energy/biofuels from waste based on the food use hierarchy** (see chapter 4.2).

In view of the bigger picture of energy sustainability, from an energy efficiency perspective it is inefficient to consider food waste as a renewable energy source. Food waste has gone through all the steps of the supply chain before becoming waste. The energy spent within each step is substantial. Therefore, **to achieve a sustainable energy system, following the food use hierarchy needs to be a guiding principle.**

Figure 4: Evolution of AD capacity in selected European countries



Source: European Bioplastics, 2015

4.9 Product information and date labelling

4.9.1 Overview

Date marking of food products has been identified as a significant factor in driving household food waste, with 15-33% of household food waste linked to date labelling issues (WRAP 2014; FUSIONS 2014). Partly this arises from the **consumer confusion between** the date marks relating to food safety (**'use by'**, a mandatory date relating to food safety) and food quality (**'best before'**, a date that advises consumers about food quality) (Flash Barometer 2015), resulting in good food being thrown away. This confusion is further reinforced by a **lack of consistency in how 'BB' and 'UB' dates are applied** to different or similar products. However, the use of multiple date types on a single product (i.e. a dairy product displaying both a 'UB' and a 'BB' date) has largely disappeared in the EU, and is also the subject of a recent global resolution by the Consumer Goods Forum⁷⁵. A study assessing how food business operators and control authorities understand and utilise date marking has been launched by the Commission which will draw further insights on current practices and will report in the first quarter of 2018⁷⁶. Similarly, there is a **lack of clarity and consistency in the use of different on-pack advice to consumers** on food storage (temperature, general storage conditions), freezing and 'once-opened' advice. This information, if acted on by consumers, can also contribute to food waste (WRAP 2012). It is also the case that unclear storage advice may result in food being stored for longer than is safe, increasing food safety risks (Newsome et al. 2014). Conversely, poor (or lack of) advice on home freezing in relation to expiry dates may result in surplus food that is suitable for home freezing being discarded by consumers.

Date marks can also influence food waste within the food supply chain, particularly where food consignments are rejected by retailers for not meeting minimum life on receipt (MLOR) criteria on delivery at retail depots (WRAP 2015; Møller et al. 2015). There has also been much confusion across the EU-28 as to whether foods can be redistributed after the "best before" date has expired). This situation has been recently clarified. In some MS it was thought to be illegal to redistribute date expired food labelled with a 'best before' date. The fact that redistribution of foods past the best before date is allowed under EU rules has been clarified in the EU food donation guidelines adopted by the Commission on 16 October 2017.⁷⁷

In relation to product life, if **expiry dates are set too early** in relation to actual product durability (the point at which quality significantly declines), then quantities of food waste are likely to increase. Conversely, if the 'buffer' between date expiry and actual durability are too close, issues of food quality and ultimately food safety

⁷⁵ Companies Commit to simplify food date labels worldwide by 2020, reducing food waste, September 2017

⁷⁶ Key highlights from the study were presented at a meeting of the EU Platform on Food Losses and Food Waste on 7 November and the final report is expected to be published by end 2017. Terms of Reference https://ec.europa.eu/food/sites/food/files/safety/docs/fw_eu_actions_tech-specs_2016-e1-024_annex2.pdf and overview of key findings https://ec.europa.eu/food/sites/food/files/safety/docs/fw_eu-platform_20171107_sub-fd_pres-08.pdf

⁷⁷ EU guidelines on food donation (2017/C 361/01)

might arise, even if overall food waste is reduced. As food businesses are highly risk averse, innovations in product formulation, production techniques and packaging technology may not result in product life extension reflected in extended date life. Finding the correct balance between setting a realistic 'safety margin' for expiry dates and food waste reduction is therefore a core consideration within the date labelling issue (WRAP 2015).

Food product information and date labelling is largely determined by legislation set at an EU level through **Regulation No 1169/2011 on the provision of food information to consumers (EU FIC Regulation)**. The EU FIC Regulation establishes the general principles, requirements and responsibilities governing food information, and in particular food labelling. Its objective is to:

1. Set clear requirements for food businesses on what information they must provide to consumers, and how such information should be presented; and
2. A list of mandatory particulars contained within Article 9 of the FIC Regulation⁷⁸

The EU FIC Regulation covers food information at all stages of the food chain in order to bring rules on general and nutritional labelling into a single regulation to simplify and consolidate existing labelling legislation. Separate regulations exist for the date marking of hens eggs, requiring a 'BB' date of a stipulated duration (28 days from laying for table eggs (EC 1234, 2007 and EC 589, 2008) and for fresh poultry meat specifying that a "use by" date shall be used⁷⁹ (EC 1906, 1990).

The FIC Regulation also sets out the standard wording that must be applied in relation to 'UB' and 'BB' dates for each MS. It is the responsibility of food business operators to decide the date type that is most appropriate for their product. In some MS this is strongly influenced by the Competent Authorities, for instance the work in Sweden that has resulted in fewer products using a UB date (Møller et al. 2015).

4.9.2 Impacts of current legislation and opportunities for improvement

Use of different date mark types

A key issue in relation to food waste are the aspects that relate to the type of date mark applied by food business operators, as well as the extent to which consumers reference the date mark and are influenced by it in their decision to discard food products. If a '**use by**' date has been applied inappropriately to a product because date expiry results in a decline in quality, but not food safety, then the food is more likely to be discarded whilst it is still good to eat.

While date marking is required by law for certain food products, it is the **responsibility of food business operators** (and within the framework of guidance from competent authorities within each Member State) to interpret the

⁷⁸ Commission Regulation (EU) 1169/2011, Article 9 (1)

⁷⁹ Commission Regulation (EC) 543/2008, Article 5(3)

EU FIC Regulation and decide on the type of date mark and product life expiry dates (with the exception of eggs and fresh poultry meat). The inappropriate choice of 'UB' date is likely to increase food waste in cases where consumers understand the implications of the date mark and use date expiry as the basis for their decision to discard the product.

The '**best before**' date (sometimes referred to as the date of minimum durability) relates to food quality (which may deteriorate after the indicated date) and is often confused with the '**use by**' date. The latter is about food safety and is intended to be applied to foods that are more highly perishable, such as fresh meat and dairy products, where there is a food safety risk associated with consumption after the expiry date.

A recent consumer market survey in the EU found that under half (47%) of Europeans understood the meaning of "best before" dates and somewhat fewer (40%) are aware of the meaning of "use by" dates (Flash Eurobarometer 2015). The survey found that, whilst knowledge of labelling was better in some countries, consumers throughout the EU have difficulties in understanding labelling schemes. For countries where understanding of 'best before' dates was highest (e.g. Sweden), far lower levels of understanding of 'use by' dates were recorded, and vice versa.

For certain food types a date of minimum durability is not required. For loose food products this is cited in Article 44 of the FIC Regulation and **exempted products** are listed in an Annex to the regulations and mainly relate to:

- Fresh fruit and vegetables (i.e. not pre-sliced or processed produce and not including legume sprouts/ sprouting seeds)
- Certain alcoholic drinks
- Bakery products that are intended to be consumed within 24 hours of baking
- Cooking salt, solid sugar, confectionery consisting almost solely of flavoured and or coloured sugars
- Chewing gum.

In addition to the application and use of date marks by food business operators, the interpretation of date marking and the implementation of legislation or guidelines by **National Competent Authorities**, can also have an impact on food waste. There may, for example, be limitations on the use and marketing of foods past the "best before" date and the availability of foods for food donations past the "best before" date (Newsome et al. 2014; Waarts et al. 2011).

Setting of dates for different product types

Procedures for setting dates may differ by EU Member State, as well as by food business operator due to differences in the interpretation of the requirements laid down in FIC regulations. In a comparative analysis of date mark practices in the Nordic countries, 64 food and drink businesses were interviewed about how dates and date marks were set in relation to 87 food products (Møller et al. 2015). The study concluded that **there is a need for a better understanding and guidance**

on food labelling terms, since companies were applying the legislation differently. For fresh pasteurized milk, for example, all products used the 'best before' label. However, the same product from different manufacturers showed differences in shelf life, with some being labelled with a date twice as long as other products in the same category (Møller et al. 2015).

The study also established **significant differences in labelling practices at the Member State level**. Swedish manufacturers extensively used 'best before' date marks for cold smoked salmon, due to established practice and legislative guidance. The same was observed for cooked as well as warm smoked ham produced by Danish and Swedish manufacturers. The research showed differences in shelf life for the same product from different manufacturers. Again it was found that the same product could be marked with a date twice as long as other products of the same category, but that differences could not be explained on an objective scientific basis, in terms of food safety or product durability. The European Commission has a project looking at date labelling practices across the EU-28, which is due to report within the first quarter of 2018. Key findings were presented at the Food Waste Platform Meeting in November 2017.⁸⁰ This is likely to show differences in how FIC Regulations have been interpreted and the study has conducted a series of mystery shopping exercises across eight Member States to collect information on current date marks and on-pack advice on food storage. The fieldwork has also included 70 stakeholder interviews with representatives from National Competent Authorities, Food Business Operators and trade bodies across EU-28. The results are likely to support many of the findings of the Nordic study in the inconsistent application of the FIC Regulation in relation to choice of date marks, on-pack storage advice and open life instructions. The issue of product life and the setting of expiry dates is made more complex by the **different standard operating temperatures of retail refrigeration** across Europe, as was found in the Nordic study (Møller et al. 2015).

Differing consumer needs and operating practices of food and drink businesses across the EU add to the complexity on how food labelling and guidance is applied to food products. For instance, the extent to which fresh produce is sold loose or packaged differs markedly across the EU, with unpackaged and 'loose' produce being the main option in many countries, particularly where modern grocery distribution represents a low proportion of per capita grocery spend (Planet Retail 2014). Where fresh produce is predominantly sold packaged, then date marks may be applied, even though this is not a requirement of the FIC Regulations (European Council 2011). Furthermore, the implications of food safety regulations (see chapter 4.3) mean that food business operators tend to be conservative in their approach to date labelling. The use of date marking safety or **quality buffers that are historic and/or overly cautious** typically affect levels of food waste (Møller et al. 2015). In these circumstances, there is a higher probability of food being disposed of before the point at which its 'actual life' has been exceeded. Quality buffers which are set beyond a date on which the product is still good to eat but of deteriorating quality before finally reaching its 'maximum' life, is generally a limiting factor to product life. This is a precautionary approach

⁸⁰ Platform meeting of 7 November. https://ec.europa.eu/food/sites/food/files/safety/docs/fw_eu-platform_20171107_sub-fd_pres-08.pdf

that is applied in product types where quality determines the limiting factor, such as for yoghurt, cheese, juice, milk and salads. For other products, such as fresh meat, food safety is the limiting factor when setting product life, as reflected in the 'use by' expiry dates applied (WRAP 2015).

An additional aspect of the date mark issue relates to the impact on food waste levels within the supply chain stemming from **logistical delays and product rotation** errors within the supply chain. Such factors reduce the 'available life' for consumers, as well as the variations in delivery performance of products arriving at retailers' depots. The WRAP 2015 study on "Reducing food waste by extending product life" highlights food waste creation further back in the supply chain caused by product returns to suppliers from Retail Distribution Centres, due to Minimum Life On Receipt (MLOR) requirements set by retailers on their suppliers (WRAP 2015). MLORs are set for a variety of reasons, such as supply chain performance, including logistical challenges for suppliers, the order quantity, delivery frequency and therefore the negotiating power of the retailer which all play a role. An example where a high MLOR is sliced bread which may require a remaining life of at least 86% on delivery to the retail depot. As a result bread may be manufactured in small batches, delivered in smaller quantities and more often, in order to maintain the high MLOR.

With regards to **consumer understanding and use of date labels** a number of in-depth studies have been undertaken. (WRAP 2014) provides the most direct evidence of the role of date labels in discarding of food and drink waste in private households. Using kitchen diary data, the study estimated that 2 million tonnes of household food became waste because it was 'not used in time', a third of which (0.66 Mt) was linked to date labels as the cause for discarding the food.

In addition, Norden produced a report with specific examples of consumer guidance for storage and durability, provided for different food products (Møller et al. 2016). This reports the different terms used by manufacturers and retailers causing misunderstandings for consumers. It concludes that clearer and more easily accessible information on different labelling, storage temperature and the durability of products is needed for consumers. The WRAP 'Consumer Insight: date labels and storage guidance' report highlighted similar findings and recommendations (WRAP 2010).

Extending product life to reduce waste

WRAP (2015) points out that product life changes can affect different product groups in a variety of ways. Extended product life will have a **greater impact on reducing food waste for products with 3-12 days of product life** than those with a life of 25-40 days. The waste prevention benefits generated by extended product life, however, are limited by the quality and safety of the product.

WRAP (2015) highlights opportunities to extend product life and to thereby reduce food waste which relate directly to the nature and duration of date marks applied, for example:

- Removal of 'display until' dates: used for retailer stock control but have the potential to confuse consumers and are not intended to inform consumers.

Not all supermarkets use these dates and some have progressively removed them in recent years.

- Variation in the application of 'use by' and 'best before' dates on certain products, such as yoghurt and juice: may confuse consumers and cause food waste as a consequence
- Extension of product life whilst meeting all food safety considerations: date labels that are applied to total life should be reformed by reducing the quality buffer within the limits of food safety requirements
- Review of MLOR criteria set by retailers: identify whether these are too onerous and as a consequence leading to food waste from increased product returns.

Improvements to date mark policies

The meaning of date labels can be clarified through **clearer guidance to food businesses and stronger enforcement of the FIC Regulations**. This option would help to reduce consumer uncertainty by giving simple and clear messages to consumers about the edibility of food, and improve the accuracy of information offered to the public.

The **simplification of date labelling regimes** is likely to result in a clearer understanding of their meaning by consumers. This has been shown to be the case by the latest survey on the issue (Flash Eurobarometer 2015).. If 'use by' dates are only applied when absolutely necessary and 'best before' dates are clearly labelled as advisory information relating to food quality, then it is likely that the understanding of food labelling would improve. In addition, confusion may occur where different types of date are applied on a single food product, such as the use of both 'display until' and 'use by' dates.. This can also encourage consumers to discard food based on the 'display until' date out of a mistaken concern for food safety. A monitoring programme across EU-28 could conduct a periodic review for a standard basket of food products and provide an independent assessment of trends in date marking practices. This would then provide background to interpret further Eurobarometer surveys on consumer understanding of date marks.

Another option is to **extend the list of food products in Annex X of Regulation 1169/2011** with a long shelf-life which enjoy a derogation from the obligation to bear a 'best before' date on their packaging. The change would mean that several products currently subject to 'best before' labelling, such as rice, pasta or coffee, could also be exempted from this requirement. A code printed on the packaging indicating the date that the product was packaged might be usefully applied to longer life products, however a study published by EC in 2015 suggested that this could actually result in more food waste ⁸¹.

⁸¹ [Milan BExpo 2015: A behavioural study on food choices and eating habits, EC 2015](#)

Provide consistent storage advice for consumers

A key issue on the labelling of many food products relates to the **storage advice** given to consumers and whether or not this is consistent with food waste prevention objectives and the optimal use of food. For instance, products that are suitable for **home freezing** may often give the instruction to 'freeze on the day of purchase', whereas the product can be safely frozen at any time before date expiry. Similar products may be labelling inconsistently within Member States and between Member States. This results in a product sold across different countries with multi-country (and language) labels often giving different storage temperature advice. So, a yoghurt with a label that includes advice for Belgian, Dutch and German consumers may have different storage temperature advice. This international dimension, although reflecting differences in opinion between food safety and labelling agencies in different countries, will add to the general sense of confusion amongst consumers. So far this aspect of European food labelling has not been fully researched.

As part of the policy suggestion to push towards simpler and clearer date labels, **clearer guidance is needed on food storage, 'once opened' advice and home freezing advice**. Furthermore, a greater understanding of the impact of different approaches to food labelling on internationally traded products is needed.

4.10 Changing consumer behaviour – (further) opportunities for policy makers

While clear and **improved product information and regulation for date labels** (see chapter 4.9) is a relevant instrument to change consumer behaviour and reduce food waste, and is hence widely debated currently, there are more options for policy makers to enable or support change. Often these options are not fully considered, since many facets of consumer behaviour are beyond the influence of policy makers and often also beyond the political will to influence them. The options at hand are **public campaigns** or the set-up of **public procurement rules**, for example for food provision in hospitals, school, and public canteens, which can be influenced by public policy and thereby reduce food waste. But also issues like influencing the **curricula for e.g. cooks' education** and putting food waste on this agenda are options for Member States to pursue.

However, preliminary results of the REFRESH research as well as previous literature insights have shown that **some of the instruments that can be used leave room for improvement in their set up**, as described in the following.

Often there is a **misperception of the reasons behind food waste on consumer level**, with a tendency in public opinion to regard current consumer culture as a 'throwaway society', and to take "current volumes of waste generation as incontrovertible evidence for the excessive, wanton nature of contemporary consumerism" (Evans 2012, 42). Yet, there is **growing empirical evidence pointing out that wasting is not a careless or carefree activity for many consumers. Consumers express anxiety and concern about food waste, yet feel that they cannot adequately change this** (e.g., Evans 2012). This is also evidenced in the REFRESH results from focus group discussions across four

countries (Spain, Germany, Hungary and the Netherlands) in the EU that were undertaken in 2016. Illustrative is the following quote from one of the participants: *“Wasting is not acceptable to me at all. But if it happens from time to time then it happens. For me that doesn’t count as wasting. It’s just the attitude that is not acceptable to me at all.”* People thus feel guilty or ashamed about wasting food, but at the same time accept that this is an inevitable consequence of consumption.

The fact that **household practices often have competing goals is another factor for consumer food waste**, which needs to be acknowledged also in the policy response. Household practices that have an impact on food waste include planning, shopping, storing, preparing, and consumption activities (Quested et al. 2013). The REFRESH focus groups have shown that during the performance of these household practices, consumers attempt to obtain multiple and sometimes competing goals, such as convenience, tastiness, healthfulness, and quantity of food. Examples include the problem of providing enough and good food for guests while at the same time trying to reduce food waste. As the accumulation of diverse practices, during which multiple goals are relevant, leads to food waste, prevention of household food waste is a complex issue.

To better understand consumer food waste drivers, the **REFRESH project set up a general framework of factors that influence household practices** and thereby the amount of household food waste (van Geffen et al. 2016). Based on prior research (Rothschild 1999)(Rothschild, 1999), a **distinction was made between three groups of influencing factors: consumer motivation, ability, and opportunity**. This framework incorporates both individual and situational factors that can lead to food waste, and is more encompassing than the theories used in many prior studies (e.g., theory of planned behaviour, which focuses mainly on individual factors). **Motivation, ability, and opportunity are all relevant for household food waste, and can therefore also be starting points for policy interventions**, such as information campaigns or educational projects. Potential interventions based on each of these three factors are outlined below.

4.10.1 Interventions to increase motivation: Awareness campaigns, emotional appeals, social norm campaigns

Motivational factors include awareness of the issue and consequences of food waste, attitudes towards food waste, and social norms about food waste. Policy interventions could address each of these. Awareness campaigns can raise the issue and may focus on increasing awareness of the amount of food waste and/or the negative consequences of food waste. However, given the complexity of the household practices involved, **increased motivation alone is probably insufficient and needs to be accompanied by skills and knowledge to be effective**. A large REFRESH survey, across four EU countries, has been set up to examine this (results not yet available).

Also, **campaigns to change consumer attitudes towards food waste may contain emotional appeals**, for instance fostering feelings of guilt or shame. Here as well, **trying to change feelings alone may be insufficient. Particularly guilt arousal may be a less effective strategy to use when consumers have low initial concern about an issue** as recent evidence in other policy areas suggests (Wonneberger 2017; in the context of environmental campaigns). In this

case consumers may use “defensive processing” (a psychological term used to describe interpreting information that supports an initial attitude) and discount negative consequences out of a desire to reduce the negative emotion (Agrawal and Duhachek 2010; in the context of alcohol consumption).

A more promising campaign strategy could be the use of social norms. Social norm campaigns have been successful in changing sustainable behaviour in other areas (Goldstein, Cialdini, and Griskevicius 2008). **Especially campaigns emphasizing the *positive behaviour of others* have shown success, whereas emphasizing *what people should do* has typically been less influential** in changing behaviour. In this respect, it is important to realize that campaigns that emphasize the high amount of food waste generated by households may actually backfire, as these suggest that food waste is “normal” behaviour that others also perform, thereby justifying the behaviour.

4.10.2 Interventions to increase ability: Consumer education

In order to address the ability factor, **education-based interventions can be used in an attempt to raise the skills and knowledge of consumers** with regard to household practices that are relevant for food waste prevention (planning, shopping, storing, preparing, and consuming). However, not only the actual skills and knowledge are relevant: **Consumers also need to be convinced that they are able to change their behaviour**, as evidenced in prior research showing that consumers’ perceived behavioural control affects household food waste (Stancu, Haugaard, and Lähteenmäki 2016). It is thus important that policy interventions aimed at consumers foster the idea that consumers are able to make a difference and can change their behaviour.

Also, **ICT tools can be used for consumer education**, but need to be wisely set up in order to be actually used and become influential on consumer behaviour. Here, preliminary insights from an inventory of available ICT tools (mostly apps) in the REFRESH project indicate that tools that provide support to consumers in making shopping lists or providing recipes are downloaded often. This is in stark contrast to apps that help consumers keep track of inventory or inform about remaining shelf-life of products, which are far less popular. This has implications for policy interventions: **education campaigns aimed at sending information may be effective when it concerns planned shopping or recipes, whereas for education about product storage and shelf-life it may be more difficult to actively engage consumers.**

Finally, an example how policy makers can **influence the ability of consumers to reduce food waste is the area of on pack information, including date labelling** (see previous chapter). In the REFRESH project, different ways of providing on-pack information about storage are examined in a survey across four countries (results expected by November). Chapter 4.9 explores this issue in more detail.

4.10.3 Interventions to increase opportunities

Opportunities relate to the infrastructure (food accessibility and food quality in stores), **materials and technologies** (in-home storage space and presence of

in-home equipment), and **consumer lifestyle** (unexpected events, time schedule). Potential policy interventions here relate, for instance, to the ongoing policy developments for eco-design/labelling measures for refrigerators (keeping food fresh for longer). With regard to consumer lifestyle accessibility of high-quality food that can be bought in convenient quantities for a fair price plays a role. Here, **public bodies and governments can themselves act as powerful role model (as well as stimulating other parties) in the area of green public procurement (GPP). They can set standards** that for example relate to size portions, staff training or availability of dishes during daytime – all having an impact on food waste and providing consumers with the opportunity to reduce food waste. In this regard the Commission's Joint Research Centre (JRC) has published an updated technical report in support of the development of non-binding EU Green Public Procurement criteria for food and catering services. This new technical report includes updated draft criteria for food and catering services, including a criterion "Food and beverage waste prevention and food and beverage redistribution" that highlights 16 best practices for preventing the generation of food waste⁸².

Also the possibility for **separate collection of bio-waste** is an option where changed infrastructures have a potential impact on food waste reduction and valorisation. Other issues mentioned in previous chapters, such as **transport infrastructure, storage** (e.g. in fishery and agriculture), cooling facilities, harvesting machine – these are all infrastructures that can be influenced (e.g. financially supported) by policy makers and thereby make a contribution for the avoidance of food waste. Insofar as this helps to ensure that consumers have access to high quality food products with a long shelf life, this may diminish in-home food waste as well.

However, there are also factors on a larger level that influence the opportunity to reduce food waste: this includes **time availability** for food waste reducing actions (which are e.g. influenced by part time working models, that can be influenced by policy makers). Also, the opportunity to get spatially **(re)connected to food production** be it through urban gardening or school gardens (that is e.g. influenced through urban planning) may play a role. Many argue that the large levels of food waste can partly be attributed to peoples lost connection with food, becoming an abundant commodity.

4.11 Voluntary cooperation in the food chain

4.11.1 Overview

While regulation has a clear role to play in many aspects of the food chain (for example, on food safety), there are other areas where voluntary cooperation may be of value. Food waste prevention is one such area, as it may require collaboration across the supply chain to achieve beneficial change.

⁸² According to the Shungham Issue Tracker (October 2017) the Commission is expected to complete the development of non-binding criteria for food and catering services in early 2018.

The starting point is that interactions across the food supply chain are generally based on contracts, not on cooperation, and food waste prevention is rarely considered in such contracts. Addressing this requires a different approach, and voluntary cooperation may be one option for doing so.

Voluntary agreements may be created by businesses without an external stimulus (for example, Codes of Practice developed by trade associations to raise the standards of their members), **but they can also be created in order to respond to developments in Government policy.** For example, in the UK the Courtauld Commitment (originally set up as a voluntary agreement between WRAP and the UK retail sector in 2005) was created in response to the UK Government's 2002 strategy document 'Waste Not, Want Not' (UK Government 2002), which called for a focus on waste prevention by the retail sector in order to help the UK achieve new targets arising from the EU Landfill Directive (1999/31/EC).

The role that governments can play in helping voluntary agreements/alliances to succeed is an issue of current interest to many countries. In October 2016 the REFRESH project published the report 'Inventory and Evaluation of Effectiveness of existing approaches to voluntary alliances' (REFRESH 2016). This summarised the different approaches taken in various existing voluntary alliances focused on food waste across Europe, evaluated their effectiveness, and identified the success factors underlying those that worked best. The report states (p.24) **that 'one of the main success factors is having government backing, including but not limited to financial support.** (...) In fact a lack of political backing and involvement was mentioned by several lead organisations as a factor hindering the success of the alliance.' On p.26, it goes on to say **'Government involvement in the setting up process can be critical. In some cases government holds the evidence for action, it often has the power to bring organisations together, it can provide impartial support and guidance, and it has the power to introduce new policy when evidence suggests it might be beneficial.** It can also **provide real motivation by imposing new, normative regulation if no voluntary action is taken, or if the voluntary approach is not successful.'**

Equally, **EU policies and action can also have a constructive impact on levels of voluntary cooperation. A good current example would be the EU Platform on Food Losses and Food Waste**, set up by the European Commission in 2016 as one of the actions arising from the Circular Economy Action Plan. This is discussed in more detail in the next sub-section.

A large part of **the REFRESH project is looking to establish voluntary cooperation (via 'Frameworks for Action') to tackle food waste along the whole supply chain in four European countries** (Hungary, Germany, the Netherlands, and Spain).⁸³ The latest report (REFRESH 2017a) considers progress by these four countries, and lessons learned to date. This work is ongoing, and is intended to inform guidance material to help countries trying to develop voluntary cooperation mechanisms in future.

⁸³ For more info see <http://eu-refresh.org/national-platforms>

Many examples of voluntary cooperation initiatives within the food chain exist across the EU. Two specific examples that illustrate what can be achieved are the Courtauld Commitment in the UK, and the EU Supply Chain Initiative.

The **Courtauld Commitment is a voluntary agreement that was set up in 2005 to reduce food and packaging waste in the UK grocery supply chain.** To date there have been three completed phases: phase 1 (2005-2009), phase 2 (2010-2012) and phase 3 (2013-2015). Across these three phases, the UK's annual household food waste arisings have reduced by 1.1 million tonnes. The agreement has now entered a new phase, Courtauld 2025, which aims to cut the resources needed to provide UK food and drink by one-fifth over ten years (2016-2025).

The **EU Supply Chain Initiative** was created in 2011 by several EU-wide trade associations, representing the food and drink industry, branded goods manufacturers, the retail sector, SMEs and agricultural traders. It aims to **promote fair business practices in the food supply chain as a basis for commercial dealings.** It has published a set of 'Principles of Good Practice in vertical relationships in the Food Supply Chain' (Supply Chain Initiative 2011).

There are **two elements of the current EU policy regime which specifically promote voluntary cooperation in the area of (food) waste prevention: Article 29 of the Waste Framework Directive, and section 5.2 of the Circular Economy Action Plan.**

Article 29 of the Waste Framework Directive (2008/98/EC) required every Member State to produce a Waste Prevention Programme by the end of 2013. In doing so, they were required to 'evaluate the usefulness' of 16 examples of waste prevention measures annexed to the Directive. Example 9 is 'the use of voluntary agreements, consumer/producer panels or sectoral negotiations in order that the relevant businesses or industrial sectors set their own waste prevention plans or objectives or correct wasteful products or packaging'. This measure covers all waste streams, including food waste.

Section 5 of the Circular Economy Action Plan (European Commission 2015b) sets out proposals for action in relation to five priority waste streams. Section 5.2 covers food waste and proposes the creation of a 'Platform on Food Losses and Food Waste'. *Inter alia*, the Platform is intended to 'facilitate inter-sector cooperation' (European Commission 2017d).

In addition, there are **three elements of the EU policy regime which have been identified as potential barriers to greater voluntary cooperation: the General Food Law, EU competition rules, and the EU VAT Directive.**

The **General Food Law Regulation (EC) 178/2002** sets out the EU's legislative requirements to ensure the safety of food and feed placed on the EU market. This includes traceability, defined in the Regulation as 'the ability to trace and follow food, feed, and ingredients through all stages of production, processing and distribution.' Since the redistribution of surplus food is legally classified as the supply of food, it is covered by the General Food Law and the **traceability requirements in the Regulation** must therefore be fulfilled. It has been

suggested⁸⁴ that these **requirements may create a barrier to greater voluntary cooperation in the food chain in respect of redistribution of surplus food**, because food producers and retailers may be reluctant to donate, as their brand reputation could be damaged by any unfortunate cases of food poisoning which occur subsequent to donation.

Article 101 of the Treaty on the Functioning of the European Union (TFEU) prohibits, with limited exceptions, agreements between two or more independent market operators which restrict competition. This provision covers both horizontal and vertical agreements. BERR (2008) raised concerns that this element of EU competition law could inhibit greater levels of voluntary cooperation.

The EU VAT Directive (2006/112/EC) is intended to harmonize VAT within the EU VAT area. It also specifies that VAT rates must be within a certain range. It has been suggested that there is a lack of clarity about the implications of the Directive for donations of surplus food to food banks, and that this lack of clarity might form a barrier to greater voluntary cooperation between retailers and food banks.

4.11.2 Impacts and opportunities for improvement

Leveraging NWPPs to support voluntary cooperation

The European Environment Agency (EEA) has so far published two **annual reviews summarising Member States' progress in implementing the requirement for National Waste Prevention Programmes (NWPPs)** set out in Article 29 of the Waste Framework Directive (EEA 2014, 2015a). The 2014 review (covering 2013) states that 7% of the policy instruments proposed in the 20 programmes submitted to the Commission by the time of the review were voluntary agreements, with these being a preferred approach in Italy, Lithuania, Luxembourg, Norway, Spain and Wales. However, data is not available on which, if any, of these voluntary agreements were related to the food chain. The 2015 review (covering 2014) states that voluntary agreements remained at 7% of the total (with 27 programmes now submitted to the Commission), with these now also being a preferred approach in Bulgaria and Estonia, in addition to the countries listed in the 2014 report.

The Waste Framework Directive includes a requirement for Waste Prevention Programmes to be reviewed at least every six years, so the first reviews should take place by the end of 2019. These reviews should provide an excellent opportunity to drive greater waste prevention in general, greater food waste prevention in particular and, greater use of voluntary cooperation as a means of implementing waste prevention measures.

Using the EU FLFW Platform to develop recommendations for changes to encourage more voluntary cooperation

The EU Platform on Food Losses and Food Waste, set up by the Commission in 2016 as one of the actions arising from the Circular Economy Action Plan, is intended to help the Commission to take measures to clarify EU legislation relating to waste,

⁸⁴ See, for example (O'Connor, Gheoldus, and Jan 2014b, chap. 5.3)

food and feed, in order to facilitate food donation.⁸⁵ The Platform therefore provides an opportunity to consider the criticisms made of the General Food Law, Article 101 TFEU and the EU VAT Directive, as set out in the previous sub-section, and to make recommendations for ways in which these three pieces of legislation might be clarified or amended so as to encourage, rather than discourage, greater voluntary cooperation in the food chain, particularly in relation to food donation and redistribution.

The work taking place under Work Package 2 of REFRESH, developing a series of pilot voluntary alliances across Europe, has already indicated that government support can be crucial to the success of such activities. This suggests that a recommendation along these lines, coming from the EU Platform on Food Losses and Food Waste, could be a useful way to encourage further voluntary cooperation in the food chain in future.

5 Need for an EU food policy?

Food waste is generated along the entire food supply chain. The magnitude of the problem is to a large degree a **symptom of a dysfunctional supply chain**. As the previous chapters have shown, food waste reduction and valorisation also **touches on a multitude of policies** such as food safety, agriculture, energy, fishery etc.

However, the **generation of food waste is not the only problem in the current global and EU food system**. Multiple crises are now afflicting food systems in the EU and around the world. Challenges related to the food system include **impacts on ecosystems, health and rural livelihoods**. According to UNEP (2016) global food systems are estimated to be responsible for a **third of degraded soils**, a quarter of greenhouse gas emissions and **60% of terrestrial biodiversity loss**, as well as the **exploitation or overexploitation of around 91% of commercial fish populations**. The **concentration on only a few crops** (FAO estimates that only 30 crops provide 95% of human food energy (FAO 2016)) in the global food systems also makes the food system **less resilient to climate change** and other challenges. Food systems are closely linked with **health impacts**, with 1.5 billion people being **overweight** (WHO 2017) and 795 million people **undernourished** globally (FAO 2015b). Moreover, approximately 1.3 billion **people depend on the agricultural sector for their livelihoods** (UNEP 2016).

The many dimensions of food systems and food waste show how complex and interdependent food related policies are. However, the complexity of food systems is politically hardly addressed so far. There is **currently no explicit EU “food policy” nor a set of publically agreed priorities** or coherent objectives for food policies in the EU. Rather, the **EU food system is shaped by a variety of different policy frameworks** ranging from trade to public health, from education to food safety or from environmental protection to employment. Each of these sectors has a different perspective on the problems and solutions of food systems: for farmers the food system is a source of employment, consumers expect safe and

⁸⁵ Further details can be found in European Commission (2015), section 5.2.

healthy food, for rural communities food systems play a role for social cohesion and cultural traditions etc. (EEA 2017a). This makes EU food policy rather a **“by-product” of political compromises in the different policy areas** (IPES Food 2017).

More specifically, the **lack of coordination leads to tradeoffs between policy areas** (often also with direct relevance to food waste), such as:

- the competition of crop production/surplus food for food use versus use as fuel,
- competition between efficiency in the agricultural sector (producing large quantities of food for a low price) versus losses of local biodiversity and food waste generation
- trade-offs between the objective to provide food at low (direct) costs and the provision and access to healthy food.
- benefits of extensive farming systems versus greater agricultural land take of these production systems (with resulting pressures on resources elsewhere, if demand does not change).

Moreover, a **disconnect can be observed between the different levels at which food systems are governed** (local, national, EU, rural-urban etc.) and few attempts have been made to systematically link local-level initiatives to policies adopted at the national or EU levels. Therefore, also from a governance level perspective, food systems are subject to frameworks and goals that potentially conflict (De Schutter 2017).

The different challenges show that an **integrated and coherent policy approach is needed** that would balance objectives, maximise synergies and reduce tradeoffs. This would require a **change from the “prevailing focus on food security and economic performance to a systems approach for sustainable food”** (EEA 2017, p.45) and the need to overcome “short-term thinking” and “sparking a transition” (De Schutter 2017). A transformation of the food system would also need to involve many forms of innovation – not only institutional and organisational, but also technological, social and behavioural (EEA 2017) – and governments would need to create space for innovation and experimentation by investments in research and development and support for upscaling and diffusion of innovation (EEA and Eionet 2016). Finally, also the **price of food** plays a role in this context. It needs to be further investigated how food prices can better reflect production costs, including their social and environmental costs.

While the ideas for a common EU food policy are comparatively new, there are **already some actions ongoing on EU level that aim to develop a shared policy perspective on food**. This momentum can also be used to further develop food waste policies and come to coherent solutions of (re-)shaping the EU food systems.

Many of the ongoing activities are outlined in the October 2017 report of the EEA “Food in a green light”, that also emphasizes the need for a coherent EU food policy. Among the diverse political initiatives are:

- **A vision building** exercise to provide a holistic and future-proof EU position on sustainable food systems **in the context of the SDGs** by the European Commission **Joint Research Centre** and the DG for International Cooperation and Development. Also, in its “Global Food Security 2030” assessment, the JRC considers “Establishing a multidimensional and cross-policy platform (i.e. inter-DGs) to address the global and interconnected dimensions of food security through a rolling and iterative process” as a “step in the right direction” (JRC 2015).
- The **foresight work of the Standing Committee on Agricultural Research**, who has provided input to **longer term perspectives on development of the food system**.
- The **development of a strategic approach to EU agricultural research** and innovation that aims to support transition pathways towards resilient, sustainable and climate-friendly farming systems and value chains to secure the long-term supply of healthy and nutritious food by **DG Agriculture and Rural Development** (European Commission 2016a).
- The **Food 2030 initiative of DG Research and Innovation's** will **explore at EU level what is needed from a research and innovation perspective** to transform and future proof food systems to be sustainable (European Commission 2016b in EEA 2017a). With regard to research, the EEA report (2017) also refers to a recent stocktaking exercise by DG Research, that identified that “the current research and innovation policy landscape lacks a food system approach and is scattered across different sectors and stakeholders with weak policy coherence and coordination”.

Also the EESC and the European Parliament stated the need for an integrated food policy:

- In 2016, the **European Economic and Social Committee** has called on the European Commission and Member States to develop a **clear EU policy and implementation plan for building a sustainable, resilient, healthy, fair and climate-friendly food system** (EESC 2016).
- In 2017, the **European Parliament** underlined that “achieving a sustainable food production and consumption system in Europe requires comprehensive and integrated food policy” in its 2017 resolution on “Resource efficiency: reducing food waste, improving food safety” (2016/2223(INI))

Moreover, from the civil society side,

- a **3-year process of research and reflection** was launched by the International Panel of Experts on Sustainable Food Systems (**IPES Food**) **to identify what policy tools would be required to deliver sustainable food systems in Europe** – or a common food policy vision (IPES Food 2017; De Schutter 2017).
- **Birdlife** International has issued a position paper in October 2017 calling for a **reform of the CAP “Towards a new European Food and Land Use Policy”** (BirdLife International 2017). In this, BirdLife “proposes four main instruments for a new European Food and Land-Use Policy, one of them a “Sustainable Food instrument” – a set of investments to build up sustainable

value chains, reduce food waste and increase the demand for healthy and environmentally sound food at fair prices.” Also, a dedicated funding instrument to “fund active waste reduction programmes is foreseen. ... The funding instrument should support pilot projects in these areas, as well as data gathering and research on, for example, the impact of EU food product standards on food waste.”

According to the **EEA** a long term strategy for food “would entail a focus on managing demand in a way that delivers food and nutrition security but not at the continued expense of ecosystem health. Managing increasing demand could involve a range of approaches, including technological, but also addressing consumer preferences. This requires a focus not just on consumers but also on actors who influence and shape the food environment and consumer preferences such as manufacturers and retailers, caterers and the media.”. The three main outcomes defined by the EEA (2017) for future food systems should be 1. Food and nutrition security, 2. Ecosystem health and 3. Social wellbeing. Synergies can e.g. be exploited if food policies support not only food waste reduction but also dietary shifts to consuming lower quantities of meat, dairy products and eggs – as these would not only reduce environmental impacts but also as reduce health risks (Westhoek et al. 2014; Tukker 2014).

The call for an EU Food Policy might also be able to profit from the **current political momentum** that is ongoing with regard to the process to come to integrated policies for the **implementation of the Sustainable Development Goals** in the EU and its MS, acknowledging that many of the SDGs have a food relevance but in different contexts.

6 Conclusions

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 agriculture, influential **differences can be found on Member State level**, be it the requirements for date labelling, the further use of batches that were withdrawn due to food safety requirements or the design of rural development measures within the CAP.

The recent **activities of the European Commission to facilitate exchange of good practices at the EU food loss and waste platform as well as the development of guidelines for certain policy areas** such as food waste measurement methodologies, food donation guidelines, guidelines for the better use of former foodstuff to feed and better use of date marking are therefore an **important step for the continuous improvement of the relevant policy areas and support for an improved national implementation**.

However, the broad range of relevant and different policy areas (even though not the full scope of relevant policies was analysed in this report, e.g. excluding donation and methodologies for measurement) also shows that **EU regulation on food is very complex and scattered in different policy areas** with a **lack of a coherent food or food waste strategy in the EU and its Member States**.

The **lack of a coherent strategy leads to trade-offs between different policy objectives** (such as bioenergy promotion versus the support of surplus food for animal feed) often **accompanied with inefficient or conflicting policy incentives** (e.g. with regard to agricultural policies). It also **often creates unnecessary barriers to prevention and valorisation** (e.g. with regard to some hygiene regulations) 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 that were reviewed in more detail in this report these opportunities for improvement in the future were found 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 security:** The main issue regarding food waste drivers related to the hygiene and food safety legislation has more 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 best practice; these should encourage more voluntary cooperation.

While the above mentioned opportunities are likely to provide improvements for food 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 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.

7 References

- Adkin, A, D. C. Harris, S. Reaney, T. Dewé, A. Hill, H. Crooke, T. Drew, and L. Kelly. 2016. 'Risk Management Measures to Reduce Exotic Disease Risk of Feeding Processed Catering Waste (Etc) to Non-Ruminants (Version 2.7)'. SE4406. Defra UK.
- Agrawal, Nidhi, and Adam Duhachek. 2010. 'Emotional Compatibility and the Effectiveness of Antidrinkng Messages: A Defensive Processing Perspective on Shame and Guilt'. *Journal of Marketing Research* 47 (2): 263–73. <https://doi.org/10.1509/jmkr.47.2.263>.
- Agricultural Markets Task Force. 2016. 'Improving Market Outcomes: Enhancing the Position of Farmers in the Supply Chain'. Report of the Agricultural Markets Task Force. https://ec.europa.eu/agriculture/sites/agriculture/files/agri-markets-task-force/improving-markets-outcomes_en.pdf.
- AHDB. 2017. 'EU Cost of Production: Estimates of the Current Cost of Pig Meat Production in Various Countries'. Agriculture and Horticulture Development Board Pork. 2017. <https://pork.ahdb.org.uk/prices-stats/costings-herd-performance/eu-cost-of-production/>.
- BERR. 2008. 'Competition Law: Issues Which Arise for Business When the Government or Lobby Groups Seek to Encourage Businesses to Work Together to Deliver Desired Policy Outcomes'. <http://webarchive.nationalarchives.gov.uk/20121205032856/http://www.bis.gov.uk/files/file45711.pdf>.
- BIO IS. 2010. 'Preparatory Study On Food Waste Across EU 27'. European Commission. http://ec.europa.eu/environment/eussd/pdf/bio_foodwaste_report.pdf.
- bipro, and Copenhagen Resource Institute. 2015. 'Assessment of Separate Collection Schemes in the 28 Capitals of the EU. Final Report'. European Commission - DG Environment. http://ec.europa.eu/environment/waste/studies/pdf/Separate%20collection_Final%20Report.pdf.
- BirdLife International. 2017. 'TOWARDS A NEW EUROPEAN FOOD AND LAND-USE POLICY'. Brussels: BirdLife International Europe and Central Asia. http://www.birdlife.org/sites/default/files/attachments/cap_position_paper_v6_final.pdf.
- BMU. 2006. 'Municipal Solid Waste Management in 2006. TAsi One Year on – No Wastes Landfilled without Pretreatment in Germany since 1 June 2005'. Berlin: BMU. http://www.bmub.bund.de/fileadmin/bmu-import/files/pdfs/allgemein/application/pdf/bericht_siedlungsabfallentsorgung_2006_engl.pdf.
- Borges, Lisa. 2016. 'One Year on: The Landing Obligation in Europe'. *ICES CIEM News* (blog). 26 February 2016. <http://www.ices.dk/news-and-events/news-archive/news/Pages/One-year-on-the-landing-obligation-in-Europe-.aspx>.

- Broad Leib, Emily, Ona Balkus, Christina Rice, Michelle Maley, Rohan Taneja, Robin Cheng, Nicole Civita, and Tiffany Alvoid. 2016. 'Leftovers for Livestock: A Legal Guide for Using Food Scraps as Animal Feed'. Centre for Health Law and Policy Innovation Harvard Law School. http://www.chlpi.org/wp-content/uploads/2013/12/Leftovers-for-Livestock_A-Legal-Guide_August-2016.pdf.
- Buckwell, Allan, Alan Matthews, David Baldock, and Erik Mathijs. 2017. 'CAP: Thinking Out of the Box. Further Modernisation of the CAP – Why, What and How?' Brussels: RISE Foundation. http://www.risefoundation.eu/images/files/2017/2017_RISE_CAP_Full_Report.pdf.
- Burgos, S., Gheoldus, M., Colin, F., Stenmarck, A., Hultén, J., Yohanan, L., Parfitt, J., Vittuari, M., Piras, S., McFarland, K., Wunder, S. (2017). "Systems maps and analytical framework. Mapping food waste drivers across the food supply chain", EU Horizon 2020 REFRESH. Deloitte, La Défense, France. <https://eu-refresh.org/mapping-food-waste-drivers-across-food-supply-chain>
- Carpenter, Griffin, and Richard Kleinjans. 2015. 'Landing the Blame: Overfishing in EU Waters 2001–2015'. London: New Economics Foundation. http://b.3cdn.net/nefoundation/476e01b03037855582_xqm6ivpuq.pdf.
- Colbert, Edd. 2017. 'Causes of Food Waste in International Supply Chains'. London: Feedback, Rockefeller Foundation. https://feedbackglobal.org/wp-content/uploads/2017/05/Causes-of-food-waste-in-international-supply-chains_Feedback.pdf.
- Colbert, Edd, and Tristram Stuart. 2015. 'Food Waste in Kenya. Uncovering Food Waste in the Horticultural Export Supply Chain.' Feedback.
- Council of the European Union. 2016. 'Food Losses and Food Waste - Council Conclusions (28 June 2016)'. <http://data.consilium.europa.eu/doc/document/ST-10730-2016-INIT/en/pdf>.
- Davies, R. W. D., S. J. Cripps, A. Nickson, and G. Porter. 2009. 'Defining and Estimating Global Marine Fisheries Bycatch'. *Marine Policy* 33 (4): 661–72. <https://doi.org/10.1016/j.marpol.2009.01.003>.
- De Meester, Victor. 2017. 'Feed Use of Foodstuffs as Part of a Food Operator's Sustainable Business Strategy'. presented at the European Former Food Processors Association conference, Brussels, March 29.
- De Schutter, Olivier. 2017. 'A Food Policy for Europe', 2017. <https://www.greeneuropeanjournal.eu/a-food-policy-for-europe/>.
- DEFRA. 2014. 'Waste Prevention Programme for England. "One Year on" Newsletter'. DEFRA. https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/385049/wppe-1yearon-newsletter201412.pdf.
- DG MARE. 2016. 'Ex-Post Evaluation of the European Fisheries Fund (2007-2013) - EU Law and Publications'. Website MARE/2011/01. European Commission. <https://publications.europa.eu/en/publication-detail/-/publication/f0ab224d-f34c-11e6-8a35-01aa75ed71a1>.
- Dorvil, Patrick L. 2017. 'Funding Biogas Infrastructures in Europe: EIB Approach.'

- EASAC. 2017. 'Opportunities and Challenges for Research on Food and Nutrition Security and Agriculture in Europe. European Academies' Science Advisory Council. December 2017'.
https://easac.eu/fileadmin/PDF_s/reports_statements/Food_Security/EASA_C_FNSA_Report_Complete.pdf.
- EC. 2017. 'The Future of Food and Farming'. COM. Brussels: European Commission.
- EC SSC. 1999. 'Intra-Species Recycling - Opinion on: The Risk Born by Recycling Animal by-Products as Feed with Regard to Propagating TSE in Non-Ruminant Farmed Animals'. European Commission Scientific Steering Committee. https://ec.europa.eu/food/sites/food/files/safety/docs/sci-com_ssc_out60_en.pdf.
- ECA. 2016. 'Combating Food Waste: An Opportunity for the EU to Improve the Resource-Efficiency of the Food Supply Chain'. No 34. Luxembourg: Publications Office of the European Union: European Court of Auditors.
- . 2017. 'EU Fisheries Controls: More Efforts Needed'. Special Report 08/2017. European Court of Auditors. http://www.eca.europa.eu/Lists/ECADocuments/SR17_8/SR_FISHERIES_CONTROL_EN.pdf.
- EEA. 2011. 'Greenhouse Gas Emissions in Europe: A Retrospective Trend Analysis for the Period 1990 - 2008'. Luxembourg: European Environment Agency (EEA).
- . 2014. 'Waste Prevention in Europe - the Status in 2013'. EEA Report 9/2014. European Environment Agency. <https://www.eea.europa.eu/publications/waste-prevention-in-europe-2014>.
- . 2015a. 'Waste Prevention in Europe - the Status in 2014'. EEA report 6/2015. <https://www.eea.europa.eu/publications/waste-prevention-in-europe-2015>.
- . 2015b. 'Waste Prevention in Europe: The Status in 2014.' EEA Report No 6/2015. Luxembourg: Publications Office of the European Union: European Environment Agency (EEA). <https://www.eea.europa.eu/publications/waste-prevention-in-europe-2015>.
- . 2016. 'Seafood in Europe: A Food System Approach for Sustainability'. EEA Report No 25/2016. European Environment Agency.
- . 2017a. 'Food in a Green Light: A Systems Approach to Sustainable Food'. Copenhagen: European Environment Agency.
- . 2017b. 'Municipal Waste Management across European Countries'. European Environment Agency. <https://www.eea.europa.eu/themes/waste/municipal-waste/municipal-waste-management-across-european-countries>.
- EEA, and Eionet. 2016. 'Sustainability Transitions: Now for the Long Term'. Eionet report No 1/2016. Copenhagen, Denmark.
- EEB. 2015. 'EEB Position Paper on the EU Circular Economy Package'. Brussels: EEB.
- . 2017. 'Revealed: Leaders and Laggards of EU Waste Policy'. <http://eeb.org/revealed-leaders-and-laggards-of-eu-waste-policy/>.

- EESC. 2016. 'EESC Opinion: More Sustainable Food Systems, Exploratory Opinion, NAT/677 EESC-2016-0232-00-00-ACTRA (EN)'. <http://www.eesc.europa.eu/?i=portal.en.nat-opinions.37923>.
- EFFPA. 2017. 'Figures and Network'. European Former Foodstuff Processors Association. 2017. <http://www.effpa.eu/figures-network/>.
- Ellen MacArthur Foundation. 2012. 'Towards the Circular Economy. Economic and Business Rationale for an Accelerated Transition'.
- ENDSEurope. 2017. 'EU Council to Enter Waste Talks with Weaker Targets.', 2017. <https://www.endswasteandbioenergy.com/article/1425059/eu-council-enter-waste-talks-weaker-targets>.
- EP AGRI. 2017. 'Committee Opinion on Initiative on Resource Efficiency: Reducing Food Waste, Improving Food Safety (2016/2223(INI))'. Committee on Agriculture and Rural Development. [http://www.europarl.europa.eu/oeil/popups/ficheprocedure.do?lang=&reference=2016/2223\(INI\)](http://www.europarl.europa.eu/oeil/popups/ficheprocedure.do?lang=&reference=2016/2223(INI)).
- EPRS. 2017. 'European Maritime and Fisheries Fund'. Briefing: How the EU budget is spent. Brussels: European Parliament Research Service. European Maritime and Fisheries Fund.
- Ermgassen, Erasmus K. H. J. zu, Ben Phalan, Rhys E. Green, and Andrew Balmford. 2016. 'Reducing the Land Use of EU Pork Production: Where There's Swill, There's a Way'. *Food Policy* 58 (Supplement C): 35–48. <https://doi.org/10.1016/j.foodpol.2015.11.001>.
- EU Commission. 2017. 'Commission Notice of 16.10.2017, EU Guidelines on Food Donation. Brussels, 16.10.2017, C(2017) 6872 Final'.
- European Commission. 2005. 'EU Waste Policy. The Story behind the Strategy.' Brussels: European Commission. http://ec.europa.eu/environment/waste/pdf/story_book.pdf.
- . 2009. 'Report from the Commission to the Council and the European Parliament on the Experience Gained from the Application of Hygiene Regulations (EC) No 852/2004, (EC) No 853/2004 and (EC)'. 852/2004. European Commission.
- . 2010. 'Commission Staff Working Document on the Understanding of Certain Provisions on Flexibility Provided in the Hygiene Package – Frequently Asked Questions, Guidelines for Food Operators'.
- . 2011a. 'A Resource-Efficient Europe – Flagship Initiative under the Europe 2020 Strategy. COM(2011) 21'.
- . 2011b. 'Roadmap to a Resource Efficient Europe. COM(2011) 571 Final'.
- . 2013. 'Report on the Responses given to the Public Consultation on the "Sustainability of the Food System"'. http://ec.europa.eu/environment/archives/eussd/pdf/food_results.pdf.
- . 2014a. 'Commission Staff Working Document. Impact Assessment on Measures Addressing Food Waste to Complete SWD (2014) 207 Regarding the Review of EU Waste Management Targets. SWD(2014) 289 Final. Part 1/4'. Brussels: European Commission - DG Environment.
- . 2014b. 'Impact Assessment Accompanying the Document "Proposal for a Directive of the European Parliament and of the Council Amending Directives

- 2008/98/EC on Waste, 94/62/EC on Packaging and Packaging Waste, 1999/31/EC on the Landfill of Waste, 2000/53/EC on End-of-Life Vehicles, 2006/66/EC on Batteries and Accumulators and Waste Batteries and Accumulators, and 2012/19/EU on Waste Electrical and Electronic Equipment. SWD(2014) 207 Final’.
- . 2014c. ‘Towards a Circular Economy: A Zero Waste Programme for Europe. COM(2014) 398 Final’.
 - . 2015a. ‘Additional Analysis to Complement the Impact Assessment SWD (2014) 208 Supporting the Review of EU Waste Management Targets. SWD(2015) 259 Final’.
 - . 2015b. ‘Closing the Loop - An EU Action Plan for the Circular Economy COM(2015) 614 Final’.
 - . 2015c. ‘European Commission - Fact Sheet Questions and Answers: New Regulation on Novel Food, Brussels, 16 November 2015’. http://europa.eu/rapid/press-release_MEMO-15-5875_en.htm.
 - . 2015d. ‘Proposal for a DIRECTIVE OF THE EUROPEAN PARLIAMENT AND OF THE COUNCIL Amending Directive 1999/31/EC on the Landfill of Waste. COM(2015) 594. 2015/0274 (COD)’.
 - . 2016a. ‘A Strategic Approach to EU Agricultural Research and Innovation’. <https://ec.europa.eu/programmes/horizon2020/en/news/designing-path-strategic-approach-eu-agricultural-research-and-innovation>.
 - . 2016b. ‘Commission Staff Working Document. Key European Action Supporting the 2030 Agenda and the Sustainable Development Goals. {SWD (2016) 390 Final}.’
 - . 2016c. ‘Proposal for a Regulation of the European Parliament and of the Council Laying down Rules on the Making Available on the Market of CE Marked Fertilising Products and Amending Regulations (EC) No 1069/2009 and (EC) No 1107/2009’.
 - . 2016d. ‘Unfair Business-to-Business Trading Practices in the Food Supply Chain’. COM (2016) 32 final. European Commission.
 - . 2016e. ‘Discarding and the Landing Obligation’. Text. Fisheries - European Commission. 16 September 2016. https://ec.europa.eu/fisheries/cfp/fishing_rules/discards_en.
 - . 2016f. ‘European Maritime and Fisheries Fund (EMFF)’. Text. Fisheries - European Commission. 16 September 2016. https://ec.europa.eu/fisheries/cfp/emff_en.
 - . 2016g. ‘Press Release: Agricultural Markets Task Force Presents Recommendations on Farmers in the Food Supply Chain’. http://europa.eu/rapid/press-release_IP-16-3658_en.htm.
 - . 2017a. ‘CAP Expenditure in the Total EU Expenditure’. https://ec.europa.eu/agriculture/sites/agriculture/files/cap-post-2013/graphs/graph1_en.pdf.
 - . 2017b. ‘Communication from the Commission to the European Parliament, the Council, the European Economic and Social Committee and the Committee of the Regions, The Role of Waste-to-Energy in the Circular Economy. COM (2017) 34 Final.’

- . 2017c. 'EU Actions against Food Waste'. European Commission - Food Safety. 2017. https://ec.europa.eu/food/safety/food_waste/eu_actions_en.
 - . 2017d. 'EU Platform on Food Losses and Food Waste'. European Commission - Food Safety. 2017. https://ec.europa.eu/food/safety/food_waste/eu_actions/eu-platform_en.
 - . 2017e. 'Food - Legislation'. 2017. https://ec.europa.eu/food/safety/biosafety/food_hygiene/legislation_en.
 - . 2017f. 'Operations and Actions of the EU Platform on Food Losses and Food Waste. Presentation by Alexandra Nikolakopoulou (European Commission, DG Health and Food Safety) at the at the EU Platform on Food Losses and Food Waste, 29 November 2016 and Platform Summary Report 2017'. presented at the EU Platform on Food Losses and Food Waste. https://ec.europa.eu/food/sites/food/files/safety/docs/fw_eu-platform_20161129_pres-operations-eu-platform.pdf and Summary report, 14 June 2017 (https://ec.europa.eu/food/sites/food/files/safety/docs/fw_eu-platform_20170614_sum.pdf).
 - . 2017g. 'Report on the Implementation of the Circular Economy Action Plan. COM(2017) 33 Final'. http://ec.europa.eu/environment/circular-economy/implementation_report.pdf.
 - . 2017h. 'Working Document in View of Preparation of EU Guidelines for Use of Former Foodstuff as Feed: Draft for Presentation to SCoPAFF'. Unpublished internal consultation document.
 - . 2017i. 'Food - Food Hygiene'. 30 May 2017. https://ec.europa.eu/food/safety/biosafety/food_hygiene_en.
 - . 2018. 'Commission Notice: Guidelines for the Feed Use of Food No Longer Intended for Human Consumption, 16 April 2018; Official Journal: OJ C 133/2'.
- European Council. 2011. 'Regulation (EU) No 1169/2011 of the European Parliament and of the Council of 25 October 2011 on the Provision of Food Information to Consumers.' <http://eur-lex.europa.eu/LexUriServ/LexUriServ.do?uri=OJ:L:2011:304:0018:0063:EN:PDF>.
- . 2013. 'REGULATION (EU) No 1380/2013 OF THE EUROPEAN PARLIAMENT AND OF THE COUNCIL of 11 December 2013 on the Common Fisheries Policy, Amending Council Regulations (EC) No 1954/2003 and (EC) No 1224/2009 and Repealing Council Regulations (EC) No 2371/2002 and (EC) No 639/2004 and Council Decision 2004/585/EC'. <http://eur-lex.europa.eu/LexUriServ/LexUriServ.do?uri=OJ:L:2013:354:0022:0061:EN:PDF>.
- European Court of Auditors. 2016. 'Combating Food Waste: An Opportunity for the EU to Improve the Resource-Efficiency of the Food Supply Chain. Special Report No. 34'. Luxembourg.
- European Parliament. 2008. 'Directive 2008/98/EC of the European Parliament and of the Council of 19 November 2008 on Waste and Repealing Certain Directives (Text with EEA Relevance).', 3–30.

- . 2009. 'Directive 2009/28/EC of the European Parliament and of the Council of 23 April 2009 on the Promotion of the Use of Energy from Renewable Sources and Amending and Subsequently Repealing Directives 2001/77/EC and 2003/30/EC (Text with EEA Relevance)'
- . 2012. 'European Parliament Resolution of 19 January 2012 on How to Avoid Food Wastage: Strategies for a More Efficient Food Chain in the EU'. <http://www.europarl.europa.eu/sides/getDoc.do?pubRef=-//EP//TEXT+TA+P7-TA-2012-0014+0+DOC+XML+V0//EN>.
- . 2013. 'Decision No 1386/2013/EU of the European Parliament and of the Council of 20 November 2013 on a General Union Environment Action Programme to 2020 "Living Well, within the Limits of Our Planet"'. <http://eur-lex.europa.eu/legal-content/EN/TXT/?uri=CELEX:32013D1386>.
- . 2016a. 'European Parliament Resolution of 7 June 2016 on Unfair Trading Practices in the Food Supply Chain (2015/2065(INI))'
- . 2016b. 'European Parliament Resolution of 16 May 2017 on Initiative on Resource Efficiency: Reducing Food Waste, Improving Food Safety (2016/2223(INI))'
- . 2017a. 'Amendments Adopted by the European Parliament on 14 March 2017 on the Proposal for a Directive of the European Parliament and of the Council Amending Directive 2008/98/EC on Waste (COM(2015)0595 – C8-0382/2015 – 2015/0275(COD)). P8_TA-PROV(2017)0070 Waste ***I. (Ordinary Legislative Procedure: First Reading)'. European Parliament. <http://www.europarl.europa.eu/sides/getDoc.do?pubRef=-%2f%2fEP%2f%2fNONGML%2bTA%2bP8-TA-2017-0070%2b0%2bDOC%2bPDF%2bV0%2f%2fEN>.
- . 2017b. 'Landfill of Waste ***I - Amendments Adopted by the European Parliament on 14 March 2017 on the Proposal for a Directive of the European Parliament and of the Council Amending Directive 1999/31/EC on the Landfill of Waste (COM(2015)0594 – C8-0384/2015 – 2015/0274(COD))1. P8_TA-PROV(2017)0071'. <http://www.europarl.europa.eu/sides/getDoc.do?pubRef=-//EP//NONGML+TA+P8-TA-2017-0071+0+DOC+PDF+V0//EN>.
- . 2017c. 'Plenary Sitting: Report on Initiative on Resource Efficiency: Reducing Food Waste, Improving Food Safety (2016/2223(INI)) – Report No A8-0175/2017'. <http://www.europarl.europa.eu/sides/getDoc.do?pubRef=-//EP//NONGML+REPORT+A8-2017-0175+0+DOC+PDF+V0//EN>.
- . 2018a. 'Legislation Train Schedule. New Boost for Jobs, Growth and Investment. DIRECTIVE on WASTE. Accessed 4 May, 2018.' URL: <http://www.europarl.europa.eu/legislative-train/theme-new-boost-for-jobs-growth-and-investment/file-directive-on-waste>.
- . 2018b. 'Provisional Agreement Resulting from Interinstitutional Negotiations. Subject: Proposal for a Directive of the European Parliament and of the Council Amending Directive 1999/31/EC on the Landfill of Waste. (COM(2015)/0594 – C8-0384/2015 – 2015/0274(COD))'
- . 2018c. 'Provisional Agreement Resulting from Interinstitutional Negotiations. Subject: Proposal for a Directive of the European Parliament

- and of the Council Amending Directive 2008/98/EC on Waste. (COM(2015)0595 – C8 0382-2015 – 2015/0275(COD))’.
- Eurostat. 2016. ‘Waste Statistics’. Eurostat. http://ec.europa.eu/eurostat/statistics-explained/index.php/Waste_statistics.
- Evans, David. 2012. ‘Beyond the Throwaway Society: Ordinary Domestic Practice and a Sociological Approach to Household Food Waste’. *Sociology* 46 (1): 41–56. <https://doi.org/10.1177/0038038511416150>.
- Fabi, Carola. 2017. ‘State-of-Play on the Global Food Loss Index to Monitor SDG Target 12.3, Carola Fabi Office of the Chief Statistician (OCS) Food and Agriculture Organization (FAO), Presentation at the EU Food Loss and Waste Platform November 7, 2017, Brussels’. https://ec.europa.eu/food/sites/food/files/safety/docs/fw_eu-platform_20171107_sub-fd_pres-03.pdf.
- FAO. 2011. ‘Global Food Losses and Food Waste - Extent, Causes and Prevention’. Rome, Italy: Food and Agriculture Organization of the United Nations. http://www.fao.org/fileadmin/user_upload/sustainability/pdf/Global_Food_Losses_and_Food_Waste.pdf.
- . 2013. ‘Toolkit: Reducing the Food Wastage Footprint’. Food and Agriculture Organization. <http://www.fao.org/docrep/018/i3342e/i3342e.pdf>.
- . 2015a. ‘Food Wastage Footprint and Climate Change’. Rome. <http://www.fao.org/3/a-bb144e.pdf>.
- . 2015b. ‘State of Food Insecurity in the World 2015 - SOFI’. Rome: Food and Agriculture Organization. <http://www.fao.org/news/story/en/item/288229/icode/>.
- . 2016. ‘Plant Genetic Resources. Use Them or Lose Them’. Commission on Genetic Resources for Food and Agriculture Fact sheet. Rome: Food and Agriculture Organization.
- Feedback. 2016. ‘Written Submission to the EFRA Committee Inquiry into the Economic, Social & Environmental Impact of Food Waste in England.’ <https://feedbackglobal.org/wp-content/uploads/2016/09/Written-evidence-from-Feedback-to-the-EFRA-committee-enquiry-of-food-waste-12.09.16.pdf>.
- Fitzpatrick, M., T. Quetglas, K. Frangoudes, G. Triantaphyllidis, and K.N. Nielsen. 2017. ‘Year 2 of the Landing Obligation: Key Issues in Mediterranean Fisheries’. Discardless Policy Brief 2. <http://www.discardless.eu/media/results/deliverable-7-2.pdf>.
- Flash Eurobarometer. 2015. ‘Food Waste and Date Marking’. 425. European Commission. <http://ec.europa.eu/COMMFrontOffice/publicopinion/index.cfm/Survey/getSurveyDetail/instruments/FLASH/surveyKy/2095>.
- Food Loss + Waste Protocol. 2016. ‘Food Loss and Waste Accounting and Reporting Standard. Version 1.0’. Consumer Goods Forum, FUSIONS, Initiative Save Food, UNEP, wbcso, WRAP, WRI. http://flwprotocol.org/wp-content/uploads/2017/05/FLW_Standard_final_2016.pdf.
- Friends of the Earth Europe. 2015. ‘Wasted Year for the Circular Economy’. <http://www.foeeurope.org/wasted-year-for-circular-economy-021215>.

- Friends of the Earth Europe, Compassion in World Farming, and Slow Food. 2014. 'Launch of the Communication on Sustainable Food', 16 July 2014. https://www.foeeurope.org/sites/default/files/foee_letter_com_sust_food_communication_160714.pdf.
- FUSIONS. 2014. 'Drivers of Current Food Waste Generation, Threats of Future Increase and Opportunities for Reduction'. <http://www.eu-fusions.org/index.php/download?download=111:drivers-of-current-food-waste-generation-threats-of-future-increase-and-opportunities-for-reduction>.
- . 2016. 'Estimates of European Food Waste Levels.' <http://www.eu-fusions.org/phocadownload/Publications/Estimates%20of%20European%20food%20waste%20levels.pdf>.
- Gassin, Anne-Laure. 2017. 'EU Food Donation Guidelines: Update'. presented at the EU Platform on Food Losses and Food Waste, Subgroup 'Food Donation', March 20. https://ec.europa.eu/food/sites/food/files/safety/docs/fw_eu-platform_20170320_pres_eu-food-donation-guidelines.pdf.
- Geffen, Lisanne van, Siet Sijtsema, Raquel Díaz-Ruiz, Patrik Eisenhauer, Anna-Carina Diedrich, Katalin Újhelyi, Feliu López-i-Gelats, et al. 2016. 'National, Qualitative Insight on Household & Catering Food Waste'. REFRESH Deliverable 1.2. REFRESH Project. <http://eu-refresh.org/sites/default/files/National%2C%20Qualitative%20Insight%20on%20Household%20%26%20Catering%20Food%20Waste.pdf>.
- Goldstein, Noah J., Robert B. Cialdini, and Vladas Griskevicius. 2008. 'A Room with a Viewpoint: Using Social Norms to Motivate Environmental Conservation in Hotels'. *Journal of Consumer Research* 35 (3): 472–82. <https://doi.org/10.1086/586910>.
- Groceries Code Adjudicator. 2016. 'The UK's Top Ten Supermarkets Have All Acted on Issues Raised by the Groceries Code Adjudicator (GCA) and Suppliers Are Seeing the Benefit.' 2016. <https://www.gov.uk/government/news/gca-achieving-significant-progress-for-suppliers>.
- Hirschnitz-Garbers, Martin, Mandy Hinzmann, Emma Watkins, Patrick ten Brink, Leonidas Miliotis, and Sebastien Soleille. 2015. 'A Framework for Member States to Support Business in Improving Its Resource Efficiency. An Analysis of Support Measures Applied in the EU-28. Final Report for DG Environment'. European Commission - DG Environment.
- Hogan, Phil. 2017. 'Speech At FSAI Conference On "Safeguarding The Food Chain" - 6th October 2017, Dublin Castle'. https://ec.europa.eu/commission/commissioners/2014-2019/hogan/announcements/speech-fsai-conference-safeguarding-food-chain-6th-october-2017-dublin-castle_en.
- Hogg, Dominic, Thomas Vergunst, Tim Elliot, Laurence Elliot, Christian Fischer, Birgitte Kjaer, Georg Mehlhart, and Volker Küchen. 2014. "Impact Assessment on Options Reviewing Targets in the Waste Framework Directive, Landfill Directive and Packaging and Packaging Waste Directive" Final Report for the European Commission DG Environment under Framework Contract No ENV.C.2/FRA/2011/0020'.

- IPES Food. 2017. 'TOWARDS A COMMON FOOD POLICY FOR THE EUROPEAN UNION: A 3-Year Process of Research, Reflection and Citizen Engagement'. http://www.ipes-food.org/images/Reports/CFP_ConceptNote.pdf.
- JRC. 2015. 'Global Food Security 2030: Assessing Trends with a View to Guiding Future EU Policies'. <http://publications.jrc.ec.europa.eu/repository/bitstream/JRC94867/lbna27252enn.pdf>.
- Kampman, Bettina, Cor Leguijt, Thijs Scholten, Jurga Tallat-Kelpsaite, Robert Brückmann, Georgios Maroulis, Jan Peter Lesschen, Koen Meesters, Natasa Sikirica, and Berien Elbersen. 2016. 'Optimal Use of Biogas from Waste Streams, an Assessment of the Potential of Biogas from Digestion in the EU beyond 2020'. European Commission. https://ec.europa.eu/energy/sites/ener/files/documents/ce_delft_3g84_bio_gas_beyond_2020_final_report.pdf.
- Kelleher, Kieran. 2005. 'Discards in the World's Marine Fisheries An Update'. FAO Fisheries Technical Paper 470. Rome: Food and Agriculture Organization. <http://www.fao.org/3/a-y5936e/index.html>.
- Lou, Ziyang, Mingchao Wang, Youcai Zhao, and Renhua Huang. 2015. 'The Contribution of Biowaste Disposal to Odor Emission from Landfills'. *Journal of the Air & Waste Management Association* 65 (4): 479–84. <https://doi.org/10.1080/10962247.2014.1002870>.
- Luyckx, Karen. 2016a. 'Starving Pigs and Bankrupt Farmers: How Food Waste Can Help'. Feedback. 2016. <http://feedbackglobal.org/2016/05/starving-pigs-and-bankrupt-farmers-how-food-waste-can-help/>.
- . 2016b. 'Interviews with Former Food Processors in Spain'.
- Massot, Albert. 2017. 'The Common Agricultural Policy (CAP) and the Treaty'. European Parliament. http://www.europarl.europa.eu/atyourservice/en/displayFtu.html?ftuId=FTU_5.2.1.html.
- Ministere de l'agriculture de l'alimentation. 2013. 'Le Plan Energie Methanisation Autonomie Azote (EMAA)'. <http://agriculture.gouv.fr/file/le-plan-energie-methanisation-autonomie-azote-ema>.
- Moates, Graham, Nina Sweet, Kate Bygrave, and Keith Waldron. 2016. 'Top 20 Food Waste Streams'. REFRESH Deliverable 6.9. REFRESH Project. <http://eu-refresh.org/top-20-food-waste-streams>.
- Møller, Hanne, Therese Hagtvedt, Nina Lødrup, Jens Kirk Andersen, Pernille Lundquist Madsen, Mads Werge, Ane Kirstine Aare, et al. 2016. *Food Waste and Date Labelling: Issues Affecting the Durability*. Nordisk Ministerråd. <http://norden.diva-portal.org/smash/record.jsf?pid=diva2:950731>.
- Møller, Hanne, Nina Lødrup, Pernille Lundquist Madsen, Åsa Rosengren, and Annika Nurttilla. 2015. *Date Labelling in the Nordic Countries: Practice of Legislation*. Nordisk Ministerråd. <http://norden.diva-portal.org/smash/record.jsf?pid=diva2:790885>.
- Morone, Piergiuseppe, Franka Papendiek, and Valentina Elena Tartiu. 2017. *Food Waste Reduction and Valorisation: Sustainability Assessment and Policy Analysis*.

<http://search.ebscohost.com/login.aspx?direct=true&scope=site&db=nlebk&db=nlabk&AN=1510938>.

- Mortensen, Lars O., Clara Ulrich, Søren Eliassen, and Hans Jakob Olesen. 2017. 'Reducing Discards without Reducing Profit: Free Gear Choice in a Danish Result-Based Management Trial'. *ICES Journal of Marine Science* 74 (5): 1469–79. <https://doi.org/10.1093/icesjms/fsw209>.
- MRAG. 2016. '4th Surveillance Report'. DFPO Denmark Eastern Baltic Cod Fishery.
- National Cattlemen's Beef Association. 2017. 'Foot and Mouth Disease Info'. Foot and Mouth Disease Info. 20 June 2017. <http://www.footandmouthdiseaseinfo.org/>.
- Newsome, Rosetta, Chris G. Balestrini, Mitzi D. Baum, Joseph Corby, William Fisher, Kaarin Goodburn, Theodore P. Labuza, Gale Prince, Hilary S. Thesmar, and Frank Yiannas. 2014. 'Applications and Perceptions of Date Labeling of Food'. *Comprehensive Reviews in Food Science and Food Safety* 13 (4): 745–69. <https://doi.org/10.1111/1541-4337.12086>.
- O'Connor, Clementine, Manuela Gheoldus, and Oliver Jan. 2014a. 'Comparative Study on EU Member States' Legislation and Practices on Food Donation, Final Report'. Europ Ean Economic and Social Committee (EESC). 2014. http://www.eesc.europa.eu/resources/docs/comparative-study-on-eu-member-states-legislation-and-practices-on-food-donation_finalreport_010714.pdf.
- O'Connor, Clementine, Manuela Gheoldus, and Olivier Jan. 2014b. 'Comparative Study on EU Member States' Legislation and Practices on Food Donation'. European Economic and Social Committee (EESC). http://www.eesc.europa.eu/resources/docs/comparative-study-on-eu-member-states-legislation-and-practices-on-food-donation_finalreport_010714.pdf.
- Pala, Christopher. 2016. 'Official Statistics Understate Global Fish Catch, New Estimate Concludes'. *Science | AAAS*, 19 January 2016. <http://www.sciencemag.org/news/2016/01/official-statistics-understate-global-fish-catch-new-estimate-concludes>.
- Papargyropoulou, Effie, Rodrigo Lozano, Julia K. Steinberger, Nigel Wright, and Zaini bin Ujang. 2014. 'The Food Waste Hierarchy as a Framework for the Management of Food Surplus and Food Waste'. *Journal of Cleaner Production* 76 (August): 106–15. <https://doi.org/10.1016/j.jclepro.2014.04.020>.
- Perchard, Edward. 2017. 'EU Set for Circular Economy Talks after Council Reaches Agreement'. resource. <http://resource.co/article/eu-set-circular-economy-talks-after-council-reaches-agreement-11861>.
- Planet Retail. 2014. 'European Grocery Retailing: Change Is the Only Constant'. 2014.
- Prellezo, Raúl, Itsaso Carmona, and Dorleta García. 2016. 'The Bad, the Good and the Very Good of the Landing Obligation Implementation in the Bay of Biscay: A Case Study of Basque Trawlers'. *Fisheries Research* 181 (September): 172–85. <https://doi.org/10.1016/j.fishres.2016.04.016>.
- Priefer, Carmen, Juliane Jörissen, and Klaus-Rainer Bräutigam. 2013. 'Technology Options for Feeding 10 Billion People. Options for Cutting Food Waste Study. Science and Technology Options Assessment. Study IP/A/STOA/FWC/2008-

- 096/Lot7/C1/SC2 -SC4, October 2013, Carried out by the Institute for Technology Assessment and Systems Analysis (ITAS), Karlsruhe Institute of Technology (KIT)'.
- Quested, T. E., E. Marsh, D. Stunell, and A. D. Parry. 2013. 'Spaghetti Soup: The Complex World of Food Waste Behaviours'. *Resources, Conservation and Recycling*, SI: Resourceful Behaviours, 79 (Supplement C): 43–51. <https://doi.org/10.1016/j.resconrec.2013.04.011>.
- REFED. 2016. 'A ROADMAP TO REDUCE U.S. FOOD WASTE BY 20 PERCENT'. https://www.refed.com/downloads/ReFED_Report_2016.pdf.
- REFRESH. 2016. 'Inventory and Evaluation of Effectiveness of Existing Approaches to Voluntary Alliances'. <http://eu-refresh.org/inventory-and-evaluation-effectiveness-existing-approaches-voluntary-alliances>.
- . 2017a. 'Frameworks for Action: Selection Process'. http://eu-refresh.org/sites/default/files/D2_3_FA%20Selection%20Process%20FINAL.pdf.
- . 2017b. 'Minutes of the REFRESH Expert Workshop "Sowing the Seeds for Short and Long Term Improved EU Policies for Food Waste: REFRESH Policy Workshop" on November 9, 2017'. http://eu-refresh.org/sites/default/files/REFRESH%20policy%20workshop_171108%20discussion%20minutes.pdf and <http://eu-refresh.org/sowing-seeds-short-and-long-term-improved-eu-policies-food-waste-refresh-policy-workshop>.
- Renda, Andrea, Fabrizio Cafaggi, Jacques Pelkmans, Paola Iamiceli, Anabela Correia de Brito, Federica Mustilli, and Luana Bebbber. 2014. 'Study on the Legal Framework Covering Business-to-Business Unfair Trading Practices in the Retail Supply Chain. Report to the European Commission, DG Internal Market'. DG MARKT/2012/049/E.
- Rizos, Vasileios, Arno Behrens, Wytze van der Gaast, Erwin Hofman, Anastasia Ioannou, Terri Kafyeke, Alexandros Flamos, et al. 2016. 'Implementation of Circular Economy Business Models by Small and Medium-Sized Enterprises (SMEs): Barriers and Enablers'. *Sustainability* 8 (11): 1212. <https://doi.org/10.3390/su8111212>.
- Rizos, Vasileios, Katja Tuokko, and Arno Behrens. 2017. 'The Circular Economy. A Review of Definitions, Processes and Impacts.' CEPS Research Report No 2017/8, April 2017. Brussels: CEPS.
- Rothschild, M. L. 1999. 'Carrots, Sticks, and Promises: A Conceptual Framework for the Management of Public Health and Social Issue Behaviors. *The Journal of Marketing*, 63, 24-37. Doi:10.2307/1251972.'
- Rozarieux, Nathan de de. 2015. 'Potential Implications of the Landing Obligation on Onshore Seafood Supply Chains in the UK'. SR690. Cornwall UK: Tegen Mor Consultants for Sea Fish Industry Authority. http://www.seafish.org/media/Publications/Seafish_landing_obligation_-_FINAL_REPORT_2_seafish.pdf.
- Sainsbury's. 2016. 'Sainsbury's Food Surplus and Food Waste: How We Are Delivering a Positive Impact'. Sainsbury's. 2016. <https://www.about.sainsburys.co.uk/news/latest-news/2016/19-09-2016>.

- Salemdeeb, Ramy, Erasmus K. H. J. zu Ermgassen, Mi Hyung Kim, Andrew Balmford, and Abir Al-Tabbaa. 2017. 'Environmental and Health Impacts of Using Food Waste as Animal Feed: A Comparative Analysis of Food Waste Management Options'. *Journal of Cleaner Production*, Towards eco-efficient agriculture and food systems: selected papers addressing the global challenges for food systems, including those presented at the Conference "LCA for Feeding the planet and energy for life" (6-8 October 2015, Stresa & Milan Expo, Italy), 140 (Part 2): 871-80. <https://doi.org/10.1016/j.jclepro.2016.05.049>.
- Schneider, Felicitas, and Silvia Scherhauer. 2009. 'Aufkommen Und Verwertung Ehemaliger Lebensmittel – Am Beispiel von Brot Und Gebäck. Studie Im Auftrag Des Bundesministeriums Für Wirtschaft, Familie Und Jugend. Endbericht, Wien, Oktober 2009'. https://www.bmdw.gv.at/Unternehmen/Documents/Studie_Verwertung%20ehemaliger%20Lebensmittel.pdf.
- Semley, John. 2017. 'Slop Machines: How a Family of Hog Farmers Manage the Excess of the World's Most Indulgent City'. *Eater*. 2017. <https://www.eater.com/2017/5/16/15639952/las-vegas-buffet-waste-pigs-rc-farms>.
- Shungham EU Issue Tracker. 2015. 'Sustainable Food: Communication'. Shungham.
- . 2017. 'Food Donation: EU Guidelines'. Shungham.
- Spar Holding AG. 2016. 'Nachhaltigkeitsbericht 2016'. http://www.businessart.at/images/doku/spar-nachhaltigkeitsbericht_2016_gesamt.pdf.
- Stancu, Violeta, Pernille Haugaard, and Liisa Lähteenmäki. 2016. 'Determinants of Consumer Food Waste Behaviour: Two Routes to Food Waste'. *Appetite* 96 (January): 7-17. <https://doi.org/10.1016/j.appet.2015.08.025>.
- Statistisches Bundesamt. 2017. 'Umwelt. Abfallbilanz 2015 (Abfallaufkommen/-Verbleib, Abfallintensität, Abfallaufkommen Nach Wirtschaftszweigen)'. Wiesbaden: Statistisches Bundesamt. https://www.destatis.de/DE/Publikationen/Thematisch/UmweltstatistischeErhebungen/Abfallwirtschaft/AbfallbilanzPDF_5321001.pdf?__blob=publicationFile.
- Stefanelli, Justine, and Philip Marsden. 2012. 'Models of Enforcement in Europe for Relations in the Food Supply Chain'. Briefing Paper. British Institute of International and Comparative Law.
- STREFOWA. 2018. 'Situation of Food Waste in Italy. Website of the STREFOWA Project (Strategies to Reduce Food Waste in Central Europe), Last Access: April 25, 2018'. <http://www.reducefoodwaste.eu/situation-on-food-waste-in-italy.html>.
- Supply Chain Initiative. 2011. 'Principles of Good Practice in Vertical Relationships in the Food Supply Chain'. www.supplychaininitiative.eu/about-initiative/principles-good-practice-vertical-relationships-food-supply-chain.
- . n.d. 'FAQ – What Is the Purpose of the Initiative?' Accessed 16 July 2017. <http://www.supplychaininitiative.eu/faq#1>.

- Tangemann, Stefan. 2011. 'Risk Management in Agriculture and the Future of the EU's Common Agricultural Policy'. Issue Paper 34. ICTSD Programme on Agricultural Trade and Sustainable Development. ICTSD Programme on Agricultural Trade and Sustainable Development.
- TI. 2018. 'MACS Collaboration Initiative on Food Losses & Food Waste, Website of the Meeting of Agricultural Chief Scientists of the G20 States; Website Coordination: Thünen Institute (TI)'. <https://www.macs-g20.org/about-macs/macs-activities/macs-collaboration-initiative-on-food-losses-food-waste/>.
- Tostivint, Clément, Karin Östergren, Tom Quested, Han Soethoudt, Åsa Stenmarck, Erik Svanes, and Clémentine O'Connor. 2016. 'Food Waste Quantification Manual to Monitor Food Waste Amounts and Progression. FUSIONS Project, Paris.' <http://www.gpp.pt/images/MaisGPP/Iniciativas/CNCDA/BRUXELASEUFUSIONSmanual.pdf>.
- Tukker, Arnold. 2014. 'Strategies for Enhancing Resource Efficiency'. In *Factor X - Policy, Strategies and Instruments for a Sustainable Resource Use*, 29:103–22. Eco-Efficiency in Industry and Science 1389–6790. Heidelberg [u.a.]: Springer.
- UBA. 2013. 'Inhaltliche Umsetzung von Art. 29 Der Richtlinie 2008/98/EG – Wissenschaftlich-Technische Grundlagen Für Ein Bundesweites Abfallvermeidungsprogramm.' Dessau-Roßlau: Umweltbundesamt.
- UK Government. 2002. 'Waste Not, Want Not: A Strategy for Tackling the Waste Problem in England'. Waste not, Want not: a strategy for tackling the waste problem in England.
- UNEP. 2016. 'Food Systems and Natural Resources, A Report of the Working Group on Food Systems of the International Resource Panel'. Nairobi: United Nations Environment Programme.
- UNSTATS. 2017. 'Tier Classification for Global SDG Indicators 15 December 2017. Tier Classification, Based on Changes Made by the Inter-Agency and Expert Group on SDG Indicators (IAEG-SDGs)'. https://unstats.un.org/sdgs/files/Tier%20Classification%20of%20SDG%20Indicators_15%20Dec%202017_web%20final.pdf.
- USDA Foreign Agricultural Service. 2016. 'EU Biofuels Annual 2016'. https://gain.fas.usda.gov/Recent%20GAIN%20Publications/Biofuels%20Annual_The%20Hague_EU-28_6-29-2016.pdf.
- Veitch, Liane, Sandy Luk, and Flaminia Tacconi. 2015. 'Maximum Sustainable Yield in the Common Fisheries Policy'. London: ClientEarth. <http://documents.clientearth.org/wp-content/uploads/library/2015-09-08-maximum-sustainable-yield-in-the-common-fisheries-policy-ce-en1.pdf>.
- Vittuari, Matteo, Paolo Azzurro, Silvia Gaiani, Manuela Gheoldus, Stephanie Burgos, Lusine Aramyan, Natalia Valeeva, et al. 2016. 'Recommendations and Guidelines for a Common European Food Waste Policy Framework'. FUSIONS Deliverable 3.5. FUSIONS Project. <https://www.eu-fusions.org/phocadownload/Publications/D3.5%20recommendations%20and%20guidelines%20food%20waste%20policy%20FINAL.pdf>.

- Vittuari, Matteo, Alessandro Politano, Silvia Gaiani, Massimo Canali, Paolo Azzurro, Maria Elander, Lusine Aramyan, Manuela Gheoldus, and Sophie Easteal. 2015. 'Review of EU Legislation and Policies with Implications on Food Waste'. FUSIONS Project. <https://www.fusions.org/index.php/download?download=221:d31-review-of-eu-legislation>.
- Vittuari, Matteo, Alessandro Politano, Silvia Gaiani, Massimo Canali, and Maria Elander. 2015. 'Review of EU Legislation and Policies with Implications on Food Waste. Final Report'. FUSIONS Project Report. Brussels: European Commission - DG Research.
- Waarts, Y.R., M. Eppink, E.B. Oosterkamp, S.R.C.H. Hiller, A.A. van der Sluis, and T. Timmermans. 2011. 'Reducing Food Waste; Obstacles Experienced in Legislation and Regulations'. LEI Report 2011-059. Wageningen. <http://www.wur.nl/en/Publication-details.htm?publicationId=publication-way-343134363631>.
- Wells, Gerald A. H., Stephen A. C. Hawkins, Anthony R. Austin, Stephen J. Ryder, Stanley H. Done, Robert B. Green, Ian Dexter, Michael Dawson, and Richard H. Kimberlin. 2003. 'Studies of the Transmissibility of the Agent of Bovine Spongiform Encephalopathy to Pigs'. *The Journal of General Virology* 84 (Pt 4): 1021-31. <https://doi.org/10.1099/vir.0.18788-0>.
- Westergaard-Kabelmann, T., and M. Dalgliesh-Olsen. 2016. 'Reducing Food Waste and Losses in the Fresh Dairy Supply Chain. QBis Consulting'. https://www.chrhansen.com/_/media/203cf0800674489ab66c5acb666e923d.pdf.
- Westhoek, Henk, Jan Peter Lesschen, Trudy Rood, Susanne Wagner, Alessandra De Marco, Donal Murphy-Bokern, Adrian Leip, Hans van Grinsven, Mark A. Sutton, and Oene Oenema. 2014. 'Food Choices, Health and Environment: Effects of Cutting Europe's Meat and Dairy Intake'. *Global Environmental Change* 26 (Supplement C): 196-205. <https://doi.org/10.1016/j.gloenvcha.2014.02.004>.
- Wonneberger, Anke. 2017. 'Environmentalism—A Question of Guilt? Testing a Model of Guilt Arousal and Effects for Environmental Campaigns'. *Journal of Nonprofit & Public Sector Marketing* 0 (0): 1-19. <https://doi.org/10.1080/10495142.2017.1326873>.
- WRAP. 2010. 'Consumer Insight: Date Labels and Storage Guidance'.
 ———. 2012. 'How to Apply Date Labels to Help Prevent Food Waste'.
 ———. 2014. 'Household Food and Drink Waste: A Product Focus'.
 ———. 2015. 'Reducing Food Waste by Extending Product Life'.
 ———. 2016. 'Using Surplus Bakery Products in Animal Feed – and Saving Money'. <http://www.wrap.org.uk/sites/files/wrap/2016%2005%2017%20Tesco%20SugaRich%20case%20study%20v1.0%20for%20publication.pdf>.
 ———. 2017. 'Courtauld Commitment 2'. <http://www.wrap.org.uk/node/9297/>.
- Zero Waste Europe. 2017. 'Simona Bonafè Drives Europe to a Circular Economy'. <https://www.zerowasteurope.eu/2017/03/simona-bonafe-drives-europe-to-a-circular-economy/>.

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8 Annex I: Summary of Japanese legislation on the prevention of TSE and the use of food waste in animal feed

Prepared by Karen Luyckx, Feedback, Annex to the chapter on animal feed

8.1 Part 1: Prevention of TSE

New Guidelines on Prevention of Intermixing of Animal Origin Proteins in Ruminant Feeds, issued by the Ministry of Agriculture, Forestry and Fisheries (MAFF), Japan. 15 Shoan No. 1570 dated 15 September 2003). http://www.famic.go.jp/ffis/feed/obj/1509161570_eng.pdf

Objective: to prevent intermixing of animal origin proteins with ruminant feeds, at various stages of production, importation, distribution, storage, feeding, and handling of feeds and feed additives... to prevent the occurrence of transmissible spongiform encephalopathies such as bovine spongiform encephalopathy (BSE) and related diseases

Basic principles in the guideline:

- Create two separate farm animal feed categories:
 - Category A: Feedstuffs and their raw materials permitted for ruminants
 - Category B: All other farm animal feedstuffs and raw materials, only permitted for poultry, pigs and fish
- Definition of "Animal Origin Protein" is similar to ABPs currently prohibited in EU legislation. Animal Origin Protein:
 - Includes protein originating from mammals, poultry, fish and shellfish, including Animal Origin Protein in surplus food and food waste, ruminant fat
 - Excludes dairy and egg products, non-ruminant fat. Gelatine and collagen only if approved by MAFF
- Animal Origin Protein is prohibited in Category A (ruminant) feed
- Ruminant blood and bone meal is prohibited in Category A and Category B feed
- Overall principles to prevent Category A feed from becoming contaminated with Animal Origin Protein or Category B feed:
 - Applied to each stage of feed chain: production, importation, distribution, storage and feeding
 - Clearly holds the final feed manufacturer and farmer responsible to ensure that any subcontracted phase of feed production or transport is done safely
 - If there is even the possibility of Category A feed having become contaminated with Category B; this feed must automatically be downgraded to Category B

- Feed business operators are expected to have written operational procedures.
- Segregation procedures are not applicable to facilities dealing only with Category B feed and farms where there are no ruminants
- Procedures and measures to ensure full and continuous segregation are expected to cover:
 - Use of fully segregated and closed areas for production, internal transport within feed manufacturing premises, packaging, reception and dispatch of raw ingredients and finished product: ie at all stages of production
 - Transportation to be done in containers exclusively used for Category A feed with clear labelling and colour-coding. Containers can be allocated to Category A feed after being cleaned rigorously. Cleaning procedure is also defined.
 - Handling and cleaning equipment should also be designated for exclusive Category A feed
 - Containers, packaging, handling equipment and storage and transport bags for each feed category need to be stored separately when not in use
- Quality control and testing:
 - Category A feed needs to be regularly tested to ensure procedures are effective, a designated quality control officer needs to be appointed, and detailed records need to be kept

8.2 Part 2: Safe use of by-products, surplus food and food waste in animal feed

Guideline for Ensuring Safety of Feeds Using Food Residues. Shoan No. 6074. Issued by Ministry of Agriculture, Forestry and Fisheries (MAFF), Japan on 30 August 2006. *Unofficial translation* provided by MAFF of the updated version including partial amendment Shoan No. 3615 of 22 December 2016. [http://www.famic.go.jp/ffis/feed/obj/Guideline for Feeds Using Food Residues.pdf](http://www.famic.go.jp/ffis/feed/obj/Guideline%20for%20Feeds%20Using%20Food%20Residues.pdf)

Heat treatment

Any by-products and former foodstuffs containing Animal Origin Protein, and all catering and kitchen waste:

- Must undergo heat treatment to inactivate pathogenic micro-organisms (30 minutes or more at 70 °C or for 3 minutes or more at 80 °C as set out in provisions for the prevention of Classical Swine Fever, available only in Japanese).
- a processor must not rely solely on the temperature settings of the treatment technology alone but should continuously monitor the actual temperature in the food waste under treatment

Food waste categories

The following categories of food waste are regulated for:

- By-products containing Animal Origin Protein (II.1.(3)), as defined in TSE guideline above
- Former foodstuffs (II.2)
- Catering kitchen waste (II.3-1) only from domestic sources (it is not permitted to use waste from international flights, ships or other foreign facilities)
- Household kitchen waste (II.3-2)
- Catering left-overs and plate scrapings (II.4-1) only from domestic sources (it is not permitted to use waste from international flights, ships or other foreign facilities)
- Household left-overs and plate scrapings (II.4-2)

Quality and hygiene responsibilities of food waste supplier

It is the responsibility of the supplier of the food waste for animal feed (referred to as "discharger" in the translation) to ensure that the above categories of food waste:

- are each stored and transported separately in a dedicated container, which must be cleaned or sterilised after each use, and kept in the best possible conditions to preserve freshness (cold storage if necessary and minimise the storage period) and to ensure the food waste cannot be accessed by birds, rodents, cats, dogs, insects and the like
- have clear recording and thorough monitoring of
 - status of separation / labelling of source of food waste
 - status of freshness (discard batches with fungi growth or which are decomposing)
 - absence of packaging and other foreign materials. It is only allowed to use catering left-overs and plate scrapings if the supplier has ensured all harmful materials such as toothpicks of cigarettes have been removed through thorough visual inspection
- It is not normally permitted to use household food waste, unless for food waste education purposes. If household food waste is used, thorough separation is required to avoid contamination with foreign matters such as pet food.

Responsibilities of the feed processor or farmer

The feed processor or farmer procuring the food waste for use in feed (referred to as "obtainer" in the translation) is required to:

- confirm that the food waste supplied meets the above requirements, and if it does not, take appropriate action. For example, if the food waste has started decomposing during transport, it must be discarded.

- Use additional mechanical means to ensure all foreign objects and packaging materials are removed (magnets, sieves in addition to visual inspection)
- if there is no refrigerated transport available, the food waste shall only be transported over very short distances
- process or use the food waste as feed as soon as possible
- apply heat treatment as described above
- comply with the segregation requirements regarding Category A (ruminant) and Category B (non-ruminant) feed as described in Part 1 of this summary
- have written operational procedures to ensure compliance with all legal requirements, including quality control
- keep extensive records on all aspects of feed treatment, transport, storage, handling, feeding etc, as detailed in the guideline

Additional responsibilities for the feed processor

- visit its food waste supplier periodically to confirm compliance of the contract
- provide training to the food waste supplier to ensure all requirements regarding separation, freshness, storage, removal of foreign materials etc are complied with
- label processed Category B feed with the wording: "This feed shall not be used for cattle, sheep, goats and deer" (penalties applicable) and "This feed shall be stored in such a way that it cannot contaminate feed or ingredients used in feed for cattle, sheep, goats and deer."

Quality and safety control

The feed processor is also responsible for sample testing and quality control as follows:

- samples shall be tested for mycotoxins, pesticide residues, heavy metals, pathogenic micro-organisms, lipid oxidation, salt, nitrate, volatile basic nitrogen. Analysis frequency and item shall depend on the product, as set out in the testing technical guidelines and methodology
http://www.famic.go.jp/ffis/oie/sub1e_activity.html
- list the date of manufacturing, date of collection of samples, analyst, analysis result, measure which was implemented based on the analysis result, etc. in a quality control ledger and preserve it for 8 years.

Contract between supplier and processor / farmer

- The supplier and the processor or farmer must agree a written contract to ensure shared responsibility for the above requirements. If applicable, such contract must be extended to the third party involved in the collection and transport of the food waste