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PART 4/4

COMMISSION STAFF WORKING DOCUMENT

IMPACT ASSESSMENT REPORT

Accompanying the document

Directive of the European Parliament and of the Council

amending Directive 2008/98/EC on waste

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ANNEX 11: IMPACTS OF THE POLICY MEASURES/OPTIONS

1- Textiles

The present chapter summarises the main impacts that could be expected from the implementation of options and measures identified in Annex 10. All three options will have economic, social and environmental impacts through a variety of channels. Based on desk research and interviews with stakeholders, the most significant impacts have been identified. This section provides an assessment of the retained measures. A quantitative assessment was performed, whenever possible, and a justification provided why a quantitative approach was not feasible. Otherwise, a qualitative assessment is provided.

In all cases the costs and benefits assessed are considered to relate directly to the measures concerned i.e., causal costs and benefits are allocated to each measure. In cases where costs and benefits would be expected to accrue under the baseline only the additional costs and benefits stemming from the measure itself are included. In the case of measure 2.9, by way of example, the resulting amounts of textiles that would be collected, sorted, reused, recycled and disposed of are the same as in the baseline. The changes resulting from the measure itself relate to the way in which those changes are funded and compliance assessed. It is these causal impacts that are, therefore, presented in this Annex.

Option 1: Supporting Member States to implement and enforce current provisions

Measure 1.1 – Clarifying definitions in relation to textiles and textile waste

Sub-measure 1.1 – Definition of '*textiles*'

Assessment of impact alternative 1

Economic impacts

Defining textiles in line with the Textile Labelling Regulation would enable a full life cycle approach to be taken for textiles in relation to their initial labelling, their management under the WFD as regards their reuse and waste management at the end of their lifespan. The definition would include raw, semi-worked, worked, semi-manufactured, manufactured, semi-made-up or made-up products encompassing a broad range of textile goods including, for example, yarns, floor coverings and carpets and would make clear that action to mitigate the environmental impacts of this broad family of textiles should be taken addressing both pre-consumer and post-consumer textiles. However, this definition is far broader than what is considered in practice as textiles in Member States and what is currently separately collected. Hence additional textile goods would be subject to the obligations currently applicable with consequent changes in waste management systems given the currently low levels of separate collection of those materials.

The volumes of these additional textiles collected under this broader scope are estimated at 4 million tonnes per year. It could be expected that for at least a proportion of these textiles where options for reuse and recycling exist that increases in such activities would take place. As noted below under environmental impacts mattresses currently have a reuse and recycling rate of 20%

across the EU and carpets have a rate of 1-3%. Including such materials in the scope of textiles under this definition and acknowledging the obligations that would then apply including the separate collection obligation under Article 11, these rates or reuse and recycling would be expected to increase. However, it is not possible to credibly quantify the additional tonnes that may be able to be reused or recycled due to insufficient data available.

This definition would pose challenges in relation to waste collection infrastructure, for example for floor coverings and carpets that are typically considered as bulky waste. Were Member States to collect 50% of this additional textile quantity (in keeping with the estimated trend for 50% collection of clothing and household textiles by 2035) the additional collection costs would amount to at least 660 million euro per year. Treatment costs for this broader family of textiles would vary given the nature of the materials collected. The reuse and recycling of floor coverings and carpets also bears little resemblance to the techniques applied to clothing and other household textiles and their possible comingling under this definition may hamper these processes rather than support them and separating them from the other less bulky textile wastes, predominantly clothing and household textiles, would entail additional costs. The manner in which these costs would be applied to this broader scope of products is likely to vary. In countries where EPR applies or is planned to apply then the costs would fall on the producer. Producers would either have to absorb those costs that would lower their profitability or increase the costs to consumers of the products themselves. Where EPR is not applied then costs may be met via the likes of disposal fees applied at the point of disposal or general taxation. The extent of these additional costs is difficult to determine. As noted in Annex 4, an impact of 0.6% of the cost of a textile item for collection, sorting and treatment has been identified as the nearest proxy for the costs of discarded textiles. A similar cost may be expected to be applied in the case of a broader scope of textiles under this sub-measure.

Footwear is not subject to the Textile Labelling Regulation. The textile component of footwear is addressed under Directive 94/11/EC relating to labelling of the materials used in the main components of footwear for sale to the consumer[1]. For those Member States that consider footwear to be included in textile waste under the WFD defining textiles based on the Textile Labelling Regulation would specifically exclude footwear for the purpose of the legislative measures within the WFD specifically targeting textiles despite the fact that the European List of Wastes does not provide a separate listing for footwear or shoes, and it is assumed that footwear is captured under codes 20 01 10 (clothes) or 20 01 11 (textiles). This contradiction could be somewhat tempered by making clear that Member States may choose to allow other apparel products such as shoes, belts or jewellery to be collected in the same collection systems as textiles (it is estimated by the JRC that footwear accounts for 5-7.5% of weight collected in separate collection systems at present). For the EPR scheme (measure 2.9), this would also cover the costs of collection and sorting of shoes and possibly other apparel included in the scope of the collection. Given the relatively small proportion by weight of these goods and their reuse

[1] OJ L 100, 19.4.1994, p.37

value, the expected impact of allowing additional items to be collected is likely to be small but would in the case of lower quality footwear make schemes less profitable overall.

Leather clothing and apparel would also be excluded under this definition. Whilst by volume such goods are likely to represent a small fraction of the clothing and apparel market (less than 1% of the collected volume of materials included in textile collection systems) they have proven to have been captured in the systems employed by Member States for textile goods and their inclusion under this option would allow Member States to continue to collect some materials for the purpose of compliance with the requirements of the WFD that apply to textile goods overall.

The effectiveness and efficiency of this sub-option would be limited by the broad nature of textiles that would be addressed i.e., resources to address textile wastes would be spread over a much larger set of textiles than are currently addressed by Member State infrastructure that focusses on clothing and household wastes that make up most textiles discarded. Furthermore, in relation to efficiency this measure would potentially increase costs of textile waste management significantly in relation to the baseline, with the expected economic value of the textiles reused or recovered likely to be less than that for a more targeted definition of textiles and accompanying measures.

With regard to pre-consumer waste, including post-industrial, pre-consumer and post-consumer commercial textile waste, the existing waste regime presently requires that the waste producer treats the waste in line with the waste hierarchy. As noted earlier, it is assumed that where there is a market value for the textile waste and transport to the recycling infrastructure is economically feasible it is valorised in view of its clear and consistent composition that requires far less pre-processing for recycling. It is expected, therefore, that there would be no or only insignificant additional costs resulting from this alternative in comparison to the baseline.

Environmental impacts

The definition in line with the Textile Labelling Regulation would include raw, semi-worked, worked, semi-manufactured, manufactured, semi-made-up or made-up products encompassing a broad range of textile goods including, for example, yarns, floor coverings and carpets and would make clear that action to mitigate the environmental impacts of this broad family of textiles should be taken addressing both pre-consumer and post-consumer textiles.

The additional 4 million tonnes of textiles collected are likely to be subject to a significant change in their waste management given their currently low levels of separate collection. This would likely lead to a greater volume of textile goods that could be reused or subject to recycling, reducing the impacts of those wastes in comparison to their disposal which is the dominant destination for these other waste types at present.

There is a degree of differentiation to be made in relation to the additionally textiles types that would be collected and the likely environmental impact from their separate collection:

Pre-consumer textile wastes are raw, semi-worked, worked, semi-manufactured or semi-made up are likely to have a more significant environmental impact due to the possibility to recycle these materials more easily than for completed and post-consumer textile wastes. This is due to:

- Fewer disruptors (for example zips and buttons) in the materials collected making them easier to recycle than textile products that contain them.
- A better understanding of the textiles' composition compared to post-consumer textiles that have a much greater variety of materials.

The recycling of fibres contained in pre-consumer textiles are estimated to be worth approximately 230 euro per tonne, with each tonne of recycled fibre saving one tonne of GHG emissions compared to its disposal. The percentage of waste volume that would fall into this pre-consumer grouping is likely to be 5-10% of textile waste generated. This would mean that approximately 200-400 000 tonnes of additional recyclable textiles would be collected. There are additional water savings through closed loop recycling because it avoids production of virgin fibre. These would equate to approximately 258M to 516M m^3 of water per year[2].

However, in relation to post-consumer textile wastes the situations is likely to be more challenging. By way of example, mattresses currently have a reuse and recycling rate of 20% across the EU and carpets have a rate of 1-3%. Developing the necessary infrastructure to collected, sort, reuse and recycle these types of textile wastes requires a different approach than for clothing and household textiles. Member States would require time to develop this infrastructure and it is unlikely that this would be feasible within the deadlines set under the existing WFD for separate collection. Therefore, the efficiency and effectiveness of this option is questionable.

Social impacts

The greatest social impacts would be linked to the need for higher levels of employment in the waste management sector. These result from Member States having to manage a broader set of products under the definition of textiles than is currently the case. In addition, there would be a reduction in the social costs of textile goods that are presently disposed and that are expected to be reused or recycled more under this measure. A clearer understanding of what textiles means in relation to the WFD is also likely to lead to more realistic and consistent data being collected whilst supporting a more level playing field between Member States. This would benefit all stakeholders including public administrations, businesses and citizens. However, the ability to split reporting to address particular textile product types is far more challenging as the Textile Labelling Regulation itself provides no such list of textile products, only a list of textile fibre names and textile products for which special provisions apply (such as specific labelling requirements or derogations). Providing reports based on textile fibre quantities by Member States is likely to be technically impossible given the mix of fibre types found in many textile products at present.

Administrative burden

[2] Norion consult for EuRIC, LCA-based assessment of the management of European used textiles, 2023.

Member States' understanding of what constitutes textiles affect the practical implementation of measures to manage textiles and textile waste and affects the related data reported by Member States. A clarification of reporting obligations by Member States by more clearly defining the textile materials that should be captured by such reporting should reduce the administrative burden on Member States in determining their own textile reporting regimes against their own definition of what textiles comprise as is the case at present. More standardised reporting resulting from this measure should, therefore, help to reduce burdens whilst producing more reliable data.

In view of maximising administrative efficiencies and synergies with existing regulatory responsibilities in the waste prevention policy, the management of the data flow on re-use of products, including on textiles is better pursued by the EEA instead of the Commission which should, according to the Article 37 of the WFD be receiving the data from Member States. It is therefore proposed to amend Article 37 of the WFD envisaging that this data flow is to be reported to and managed by the EEA. This would require allocation of additional resources to the EEA for the fulfilment of this task.

Impact on SMEs and social enterprises

Most producers in the textiles' ecosystem are micro-enterprises (88.8% of 127 000 enterprises), with only 0.2% of enterprises being large companies. Clarifying the definition of textiles according to the Textile Labelling Regulation is likely to have no significant additional administrative burden on SMEs as they already comply with the Textile Labelling Regulation (unless they are subject to the specific exclusions provided for in that Regulation).[3] On the contrary SMEs are likely to benefit from an alignment of the scope which makes the applicable rules easier to understand.

Defining textiles according to the Textile Labelling Regulation would significantly expand the types of textiles to be collected under Article 11(1), potentially adding significant burden to social enterprises as well as any commercial SMEs that operate collection systems. Those systems would have to expand to include textiles that are currently not targeted. Such a broadening would have significant negative impacts on SME collectors and social enterprises which are currently focusing on the collection of reusable textiles due to their value. This impact may be offset if the differing nature of these other textile products in terms of their methods of collection storage and recycling was considered in identifying the relevant actors for their management. By way of example, discarded mattresses are unlikely to be resold in social enterprises and are more likely to be sent for recycling where their most valuable components (metals and foams) are removed by actual waste management companies means that Member States could not simply rely on the existing clothing and household textile collectors to manage

[3] The Regulation does not apply to textile products which are contracted out to persons working in their own homes or to independent firms that carry out work from materials supplied without the property therein being transferred for consideration. It also does not apply to customised textile products made up by self-employed tailors.

mattresses – instead a more active engagement of waste management companies would be required to be implemented.

Stakeholder evidence

Stakeholders indicated that this is a useful measure if it includes a clear scope on what products are included – and excluded – in the term 'textiles' for the purpose of the WFD and "would help to establish what is to be included in separate collections" [4]. Stakeholders do not think it is necessary to regulate how collections are carried out but indicate that a common scope is essential.

Stakeholders consider that items thrown away should be deemed as waste. In a few EU countries, there are bins for both reusable and non-reusable textiles, but these are often mixed-up by consumers. The sorting needs to be carried out by professional sorters, therefore better labelling and/or definitions might not resolve this. The same respondent considered that over-the-counter donations should also be considered waste because the fact that a product is donated for an economic purpose (potentially ruling it out of being considered waste) is important, but not a determining factor as there is an economic factor behind many choices, including recycling and to align it with economic element would mean nothing would ever be classed as waste.

All alternatives are considered to be suitable alongside an EPR scheme.

Assessment of impact alternative 2

Economic impacts

Setting a definition in keeping with the CN Regulation would provide a definitive list of textiles for the purpose of the WFD. The CN codes themselves provide a list by which producers of post-industrial pre-consumer and post-consumer commercial textiles waste would be addressed by the codes addressing raw, semi-worked, worked, semi-manufactured, manufactured, semi-made-up or made-up products (generally chapters 50, 51, 52, 53, 54, 55, part of 56, 57 (with the exception of turf), 58 and 60) whilst post-consumer household waste should be easily identifiable using the codes under chapters 60, 61, 62, parts of 63 and parts of 65. Descriptions like 'overcoats', 'shirts and blouses' and the like being generally understandable to consumers discarding textiles as well for those who are likely to be involved in the subsequent treatment of textiles under the WFD. This improved delineation of textile products covered by the WFD - and subsequent national provisions - would enable a level playing field as it would provide a common understanding of the scope of textiles and textile waste in comparison to the present. It would also allow more targeted action to be put in place in comparison to alternative 1 that would address a broader and less clearly delineated set of textiles. Economically, this would ensure that action is focussed on those textiles that warrant action under the WFD and ensure a level playing field across the EU in terms of what is required of Member States.

[4] Interview with Ellen MacArthur Foundation.

Similarly to Alternative 1, since the existing waste regime already requires waste producers to treat their waste in line with the waste hierarchy, it is expected that there would be no or only insignificant additional costs resulting from this alternative in comparison to the baseline.

The impacts in terms of volumes of textile wastes separately collected, sorted and treated would be dependent on the final scope of CN codes included under this measure. If the scope remained similar to the scope currently employed by Member States (i.e. with a focus on post-consumer clothing and household textiles) flows would be unlikely to vary in comparison to the baseline. However, should additional textile types be included then the collection, sorting and treatment of those textiles would be expected to increase in keeping with obligations that currently apply to textiles including the separate collection obligation under Article 11. Whilst an increase would be expected, it has not been possible to quantify the potential increase in tonnes as not all Member States have provided details as to the scope of textiles that they currently consider in their own textile management schemes to allow such quantification to take place.

Footwear and leather clothing and apparel would be included under this definition. Given that these types of goods have proven to have been captured in the systems employed by Member States for textile goods their inclusion under this option would allow Member States to continue to collect some materials for the purpose of compliance with the requirements of the WFD that apply to textile goods overall. This would avoid a situation whereby Member States may otherwise feel the need to employ separate systems for such clothing and apparel that is unlikely to be economically viable given the relatively small quantities concerned.

Similarly, any addition in scope would entail additional collection, sorting and treatment. As for Alternative 1, in countries where EPR applies or is planned to apply then the costs would fall on the producer. Producers would either have to absorb those costs that would lower their profitability or increase the costs to consumers of the products themselves. Where EPR is not applied then costs may be met via the likes of disposal fees applied at the point of disposal or general taxation. Similarly for Alternative 1, the additional costs are likely to fall around 0.6% of total product cost with the application of those costs being absorbed by the producer, being passed on to the consumer or a mix of both.

Environmental impacts

The definition would include raw, semi-worked, worked, semi-manufactured, manufactured, semi-made-up or made-up products encompassing a broad range of textile goods including, for example, yarns, floor coverings and carpets and would make clear that action to mitigate the environmental impacts of this broad family of textiles should be taken addressing both pre-consumer and post-consumer textiles. This would mean that the separate collection provisions of Article 11(1) for which the majority of Member States have targeted clothing and household textiles could be defined as significantly broader, obliging Member States to provide for separate collection of other textiles types with the expected environmental benefit from greater levels of separate collection being higher levels of reuse and / or recycling of those materials than at present.

In comparison to alternative 1, alternative 2 offers the opportunity to include additional specific products such as entire mattresses, umbrellas and textile covered furniture by referring to the relevant applicable CN code allowing the environmental impacts of these specific product types to be addressed under the already existing obligation for separate collection under Article 11(1).

As outlined in the description of alternative 3, the WFD applies to a broad range of wastes with only certain exclusions as outlined in Article 2. Defining textiles based on a limited number of CN codes poses the risk of unnecessarily restricting the scope of measures for textiles under the WFD, thereby preventing action being taken on other problematic textile and textile like wastes. A long list has been drawn up as included in Table 39 but there may be additional materials containing textiles – for example Chapter 94 that includes furniture – that may warrant action that would be excluded in alternative 2. A possible solution to address this would be to make the list under this option progressive i.e., the list could subsequently be complemented as other textile containing products are identified that warrant action to address the waste management challenges associated with them.

Social impacts

A clearer understanding of what textiles means in relation to the WFD is also likely to lead to better and more realistic data being collected whilst supporting a more level playing field between Member States. This would benefit all stakeholders including public administrations, businesses and citizens. The ability to identify textiles by specific codes, in theory at least, allows greater precision of textiles and textiles waste reporting according to the CN code. However, whilst this granularity would provide more helpful information, requiring reporting for all the CN codes suggested for inclusion as the definition of 'textiles' is likely to prove overly burdensome in comparison to the usefulness of the data collected.

Administrative burden

As is the case for alternative 1, a clarification of what Member States should be reporting as 'textiles' should reduce the administrative burden on Member States in determining their own textile reporting regimes. More standardised reporting should help to reduce burdens whilst producing more reliable and comparable data. Given the greater clarity of scope of alternative 2, it is likely that the administrative burden reduced by alternative 2 would be greater than that of alternative 1. It is estimated that the administrative burden reduction stemming from a clarification of reporting obligations would result in savings of approximately 250 000 euro per year.

Impact on SMEs and social enterprises

As in alternative 1, given over 99% of producers of textiles are SMEs, clarifying the definition of textiles is unlikely to have any significant impact on SMEs as they already comply with the

textile labelling Regulation unless subject to the specific exclusions provided for in that Regulation[5].

As under alternative 1 and depending on which CN codes are included, defining textiles according to CN codes could significantly expand the types of textiles to be collected under Article 11(1). This could potentially add significant burden to social enterprises as well as any commercial SMEs that operate collection systems to cover the textiles not currently targeted by their collection schemes. Such a broadening would have negative impacts on SME collectors and social enterprises accordingly in view of the increasing share of non-reusable fractions. However, using a list that is in keeping with current interpretations applied in most Member States would limit this potential impact. This is without prejudice to measure 2.9.

Stakeholder evidence

Stakeholders mentioned that aligning terminology and regulations will provide a common understanding and be the basis for better monitoring of a wider set of fibres and products. This should be combined with the JRC work on EoW criteria for textiles to ensure there is a clear definition of what are textiles and when they cease to be waste[6]. Stakeholders indicated that establishing clarifying definitions on waste and ownership of waste, and to what extent waste should be exported if it cannot be recycled is critical.[7].

Assessment of impact alternative 3

Economic impacts

Alternative 3, in comparison to alternatives 1 and 2, would take a broad definition of textiles for the general purpose of the WFD, whilst allowing the targeting of specific measures to specific textile types. By way of example, defining textiles more broadly in relation to reporting requirements would allow the Commission to define data collection across several different textile product types in order to better understand the volumes of textile types placed on the market, the methods of their management when they become a waste and the challenges that may require action to be taken in the future. At the same time, narrowing specific measures to specific textile types using CN codes allows measures to be targeted more effectively than referring to textiles in general. A good example of where this may be best applied is in relation to Article 11(1) whereby a focus on the largest share of textile wastes – clothing and household textiles – would avoid Member States focussing efforts on other wastes that were not originally intended to be addressed by such measures or for which another different targeted approach should be applied. Such lists of textile types subject to specific measures based on CN codes need not

[5] The Regulation does not apply to textile products which are contracted out to persons working in their own homes or to independent firms that carry out work from materials supplied without the property therein being transferred for consideration. It also does not apply to customised textile products made up by self-employed tailors.
[6] Feedback from workshop.
[7] Interview with Teko & Svenshandel

necessarily be addressed in the definition Article of the WFD itself (Article 3) but could be included in an Annex of textile products to which specific measures are addressed.

Additionally, a broad reading of textiles would be at odds with the definitions currently applied by Member States, requiring them to expand the systems in place to address textiles in their implementation of the WFD. This alternative would avoid the necessity of those changes. This is particularly important for more specialist textile types such as tents, awning, umbrellas and other materials designed for particular use conditions. Such materials may be challenging in relation to recycling due to their composite material and the likely use of chemicals for the purpose of waterproofing in their everyday use. The reuse potential of these additional materials may also be hindered by the issue of scale of materials concerned i.e., they represent roughly 3% by weight of what would constitute textiles but are more specialist in their application.

As is the case with alternatives 1 and 2, the existing waste regime already requires waste producers to treat their waste in line with the waste hierarchy. Therefore, it is expected that there would be no or only insignificant additional costs resulting from this alternative in comparison to the baseline.

Furthermore, in keeping with alternative 2 the impacts in terms of volumes of textile wastes separately collected, sorted and treated would be dependent on the final scope of CN codes included under this measure. If the scope focussed on post-consumer clothing and household textiles flows would be unlikely to vary in comparison to the baseline.

Footwear and leather clothing and apparel would be included into the separately collection schemes under this alternative. Given that these types of goods have proven to have been captured in the systems employed by Member States for textile goods their inclusion would allow Member States to continue to collect some materials for the purpose of compliance with the requirements of the WFD that apply to textile goods overall. This would avoid a situation whereby Member States may otherwise feel the need to employ separate systems for such clothing and apparel that is unlikely to be economically viable given the relatively small quantities concerned.

However, should additional textile types be included that are not currently addressed by Member States under their obligations under the WFD then the collection, sorting and treatment of those textiles would be expected to increase in keeping with obligations that currently apply to textiles including the separate collection obligation under Article 11. Whilst an increase would be expected, it has not been possible to quantify the potential increase in tonnes given the data at the Member State level that dictates their current scope of textile waste management is not accessible across the EU but only for a proportion of Member States as presented in Annex 6.

Similarly, any addition in scope would entail additional collection, sorting and treatment. As for alternatives 2 and 3, in countries where EPR applies or is planned to apply then the costs would fall on the producer. Producers would either have to absorb those costs that would lower their profitability or increase the costs to consumers of the products themselves. Where EPR is not applied then costs may be met via the likes of disposal fees applied at the point of disposal or

general taxation. Similarly for alternative 1 and 2, the additional costs are likely to fall around 0.6% of total product cost with the application of those costs being absorbed by the producer, being passed on to the consumer or a mix of both.

Environmental impacts

As is the case for alternatives 1 and 2, the definition used under this alternative would include raw, semi-worked, worked, semi-manufactured, manufactured, semi-made-up or made-up products encompassing a broad range of textile goods including, for example, yarns, floor coverings and carpets and would make clear that action to mitigate the environmental impacts of this broad family of textiles should be taken addressing both pre-consumer and post-consumer textiles.

In comparison to alternative 1 the opportunity exists to include additional specific materials such as. entire mattresses, umbrellas and textile covered furniture by referring to the relevant applicable CN code allowing the environmental impacts of these specific product types to be addressed.

As outlined in the introduction to alternative 3, the WFD applies to a broad range of wastes with only certain exclusions as outlined in Article 2. Defining textiles based on a limited number of CN codes poses the risk of unnecessarily restricting the scope of measures for textiles under the WFD, thereby preventing action being taken on other problematic textile and textile like wastes. A long list has been drawn up as included in the table above but there may be additional materials containing textiles – for example Chapter 94 that includes furniture – that may warrant action that would be excluded using the list provided. A possible approach to address this would be to make the list under this option progressive i.e., the list could be subsequently expanded to cover other textile containing products as deemed necessary based on their waste management challenges, for example furniture.

This alternative, under the broad heading of textiles as per the Textile Labelling Regulation, would continue to exclude certain products that require attention, for example mattresses that generate approximately 240 000 tonnes of textile waste per year and carpets that generate approximately 1.6 million tonnes of waste (the share of textiles is unknown). However, given the challenges in addressing the traditional use of a latex, water-based backing which cannot be removed from the pile fibres and creates a difficult-to-recycle material mix as well as the collection challenges related to textile waste this exclusion appears relevant given the lack of practicable options to address carpet waste as a textile at present. In the case of both mattresses and carpet an alternative categorisation exists under the WFD e.g., bulky waste, but for those Member States currently considering measures on mattresses under the textile heading these would generally be excluded as textiles using this definition. According to information provided by Member States, Hungary is the only Member State that currently considers carpets under their textile waste measures.

Social impacts

As is the case under alternatives 1 and 2, a clearer understanding of what textiles means in relation to the WFD is also likely to lead to better and more realistic data being collected whilst supporting a more level playing field between Member States. This would benefit all stakeholders including public administrations, businesses and citizens.

The alignment with the Textile Labelling Regulation in the definition of textile products would allow to harmonise this term across legislation applying textiles.

On the other hand, under this alternative it would be possible to define by CN-code specific measures addressing a subset of textile products and including non-textile wastes which currently are also captured in the same systems employed by Member States for textile goods.

Administrative burden

As is the case for alternatives 1 and 2, a clarification of reporting obligations should reduce the administrative burden on Member States in determining their reporting regimes against their current definition of what 'textiles' comprises. More standardised reporting resulting from this measure should, therefore, help to reduce burdens whilst producing more reliable data. Given the more specifically defined scope of reporting by specific textiles types, the administrative burden reduced by alternative 3 would likely be greater than alternative 1. It is estimated that the administrative burden reduction stemming from a clarification of reporting obligations would result in savings of approximately 250 000 euro per year.

Impact on SMEs and social enterprises

As noted under alternatives 1 and 2, in relation to producers of textiles, most companies involved in the textiles and clothing industry are micro-enterprises with only 0.2% of enterprises being large. Clarifying the definition of textiles according to the Textile Labelling Regulation is likely to have no significant additional admin burden on SMEs as they already comply with the Textile Labelling Regulation (unless they are subject to the specific exclusions provided for in that Regulation).[8] On the contrary SMEs are likely to benefit from an alignment of the scope which makes the applicable rules easier to understand.

Alternative 3 offers the greatest flexibility to both make sure that textiles in their entirety are addressed by using the definition of textiles from the textile labelling Regulation whilst targeting specific measures within the WFD at specific textile types by referring to specific CN codes. Depending on the limit of the textiles determined to be addressed under this option, defining textiles according to CN codes could significantly expand the types of textiles that to be collected under Article 11(1), potentially adding significant burden to social enterprises as well as any SME commercial operators that operate collection systems to expand those systems to address textiles that are currently not targeted by their collection schemes. Such a broadening

[8] The Regulation does not apply to textile products which are contracted out to persons working in their own homes or to independent firms that carry out work from materials supplied without the property therein being transferred for consideration. It also does not apply to customised textile products made up by self-employed tailors.

would have significant negative impacts on SME collectors and social enterprises accordingly. However, using a list that is in keeping with current interpretations applied in most Member States would limit this potential impact for the likes of Article 11(1) by focussing on clothing and household textiles whilst ensuring greater consistency of application of these measures for SMEs and social enterprises across the EU.

Stakeholder evidence

Stakeholders felt that a clear definition of reusable/recyclable is needed for textiles as currently, no specific criteria exist for an objective classification of discarded textiles into reusable or recyclable. This lack of definitions directly hampers a homogeneous classification of garments and the application of the waste hierarchy.[9]

For all alternatives there was consensus that any definitions should be EU-wide. This would ensure consistency which will drive ease of sharing, exports, and economies of scale. In addition to this, these definitions should be equally enshrined within all the different EU legislations to ensure shared indicators/reporting and objectives. This should include definitions of legally responsible economic operators as well as business related activities such as repair, remanufacture (remake) and second-hand must also be clearly stated and harmonized within all EU legislations [10] and possible beyond (i.e., Norway). [11]

Comparison of alternatives 1, 2 and 3 in terms of scope

Given that one of the most notable differences between alternatives 1 and 2 is in relation to the scope of textile products that would be addressed, the table below summarises the differences in scope that would be seen. Alternative 3 captures all elements in green for alternatives 2 and 3. However, under alternative 3 it would be possible to specify particular textile categories for different measures i.e., the overall definition of textiles would be broad as in alternative 1 but specific measures could be targeted at specific CN codes using an approach defined under alternative 3. By way of example, an Annex could be added to the WFD containing a list of textiles by CN code for which measures such as separate collection, EPR, reporting should be applied. This would be more precise than under alternative 1 but would prevent the exclusion of textile materials from the broader measures that might otherwise be the case under alternative 2. However, the data and information currently collected through official statistics applies the CN code approach, and thus would ensure consistency and complementarity, in particular in view of the proposed EPR scheme (Measure 2.9).

[9] Evidence from workshop.
[10] Evidence from workshop.
[11] Interview with Teko & Svenshandel.

Table 1: *Scope of the three alternatives*

Product type	Production phase													
	Raw		Semi-worked		Worked		Semi-manufactured		Manufactured		Semi-made up		Made up	
	Sub-option 1	Sub-option 2	Sub-option 1	Sub-option 2	Sub-option 1	Sub-option 2	Sub-option 1	Sub-option 2	Sub-option 1	Sub-option 2	Sub-option 1	Sub-option 2	Sub-option 1	Sub-option 2
Textile fibres, yarns and fabrics														
Finished textile clothes														
Household textiles														
Shoes														
Leather clothing and apparel														
Jewellery and other accessories														
Mattresses[1]														
Carpets and other floor coverings														
Tents, tarpaulins, umbrellas and sails														

Within scope

Not within scope

Table 2: Summary of impacts for measure 1.1 – Alternatives 1-3 definition of 'textiles'

Stakeholder affected	Economic impacts	Environmental impacts	Social impacts
Producers, waste managers (encompassing collectors, sorters and managers)	Improves the level playing field through a common understanding of the scope of textiles and textile waste. + Reduce administrative costs to determine the scope of textiles to be managed under the WFD. Alternatives 2 and 3 would offer greater clarity and a greater scope for admin burden reduction in comparison to alternative 1.		Businesses would benefit from the information derived from the clarifying definitions
Public authorities	Reduces administrative costs to determine the scope of textiles to be managed under the WFD.		Public authorities would be able to produce and access more consistent information enabling comparison.
Citizens			Citizens would benefit from the information derived from the clarifying definitions.

All stakeholders		Clarified definitions will allow a clearer scope of measures to be applied, thereby allowing Member States to better focus their resources in addressing textile waste. This should, in turn, result in greater environmental improvements compared to the status quo as the most important environmental impacts would be addressed first.	

Sub-measure 1.2 – Definition of '*textile waste'*

Assessment of impact alternative 1

Economic impacts

Setting a definition that requires all separately collected textiles to be considered waste would enable a consistent approach across all Member States in comparison to the status quo.

However, the application of waste status to all separately collected textiles carries with it the possibility to place burdens on actors, particularly social enterprises that are required in some cases to have the necessary authorisations to collect and sort waste in one Member State when a neighbouring Member State does not require such authorisations as textiles only become waste later in the processing of the materials collected. Data from the social enterprise sector[12] indicates that the majority of those involved in the separate collection of wastes, including social enterprises, are already in ownership of the necessary waste management permissions and so whilst some impacts are likely for a minority of actors the negative impacts of this measure are likely to be limited.

Additionally, applying waste status at the point of collection risks a deterioration in the quality of textile materials collected in separate collection systems – if those depositing textile materials are

[12] Communication between the European Commission and RREUSE, November 2022.

told that all textile materials are welcome because they will be subsequently sorted into reusable and recyclable, then lower quality materials may be collected, increasing the costs of collection and sorting for sorters, including social enterprises whilst lowering the quality of feedstock for preparation for reuse and recycling. This effect can be and is already addressed by instructions that are typically found on separate collection bins and other separate collection systems. It would be important in the application of this sub-option, therefore, to ensure that such instructions are maintained to minimise this risk from materialising in practice.

In relation to data needs, determining waste status at the point of collection sets a clear demarcation line for reporting purposes. This would assist in the present reporting requirements under Commission Implementing Decision C(2020) 8976 for reporting on reuse as the total fraction of reused textiles could be set against the total amount of textile waste separately collected through all collection systems using the same starting point as to when those materials became waste. It would also allow any new reporting requirements to have the same starting point in the future.

Environmental impacts

This alternative would put in place the protections under the WFD in relation to the correct handling of those materials following their collection and the application of the waste hierarchy to the materials contained therein. It would also address the high risk of waste that forms a part of the materials separately collected being falsely considered as non-waste and its potential export to third countries. Whilst measure 2.8 that would set requirements for the shipment of textiles for reuse, would offer some protection in this respect, in the absence of that measure the risk would remain high.

This definition also acknowledges that those depositing textiles are not always able to determine whether a textile is suitable for reuse/recycling or not, which leads to reusable textiles being discarded as waste and non-reusable or recyclable textiles being deposited in separate collection systems. Determining that all such materials are waste until they are professionally sorted into their respective reuse, recycling and disposal fractions addresses this problem directly by requiring waste management approaches to be applied from the outset. Measure 2.5 specifically addresses sorting obligations with the link in mind.

MWE, representing public waste management organisations[13] highlighted that the 'use and dispose' culture mindset is largely fostered across the entire textile supply chain. It is, in turn, adopted by consumers, driving increasing volumes of textile waste generation. This is matched by a lack of consumer understanding of the true costs of textile production beyond the purchasing price as identified during the first stakeholder workshop by an NGO. A stakeholder representing the social enterprise, reuse and repair sector [14], noted that the consumer to consumer (C2C) textile market is flourishing but this does not prevent the sale of new textiles. Indeed,

[13] Municipal Waste Europe
[14] RREUSE

when people know that they can sell their products on C2C platforms they may tend to buy even more products in what is known as the rebound effect. Stakeholders also identified the lack of sufficiently robust data on used textiles and textile waste as a barrier to developing sufficient waste prevention programmes.

Social impacts

Applying waste status at the point of collection should ensure that the materials contained therein are managed as waste. In the context of existing issues with the export of used clothing and textiles to third countries under the guise of used (but not waste) textiles that are subsequently disposed of in third countries, this would be less likely to occur in the context of all materials having to be handled as waste until sorting had taken place to differentiate between waste and non-waste (reusable) fractions.

Impact on SMEs and social enterprises

As noted under economic impacts the application of waste status to all separately collected textiles carries with it the possibility to place burdens on actors, particularly social enterprises that are required in some cases to have the necessary authorisations to collect and sort waste in one Member State when a neighbouring Member State does not require such authorisations as textiles only become waste later in the processing of the materials collected. Data from the social enterprise sector[15] indicates that the majority of those involved in the separate collection of wastes, including social enterprises, are already in ownership of the necessary waste management permissions and so whilst some impacts are likely for a minority of actors the negative impacts of this measure are likely to be limited.

SMEs other than social enterprises are unlikely to be significantly impacted by this measure as they are already likely to hold the necessary authorisations to collect and sort waste.

Assessment of impact alternative 2

Economic impacts

Setting a definition that requires all separately collected textiles to be considered as waste only after sorting would lead to greater consistency of approach across all Member States. Materials that are in fact waste would be defined accordingly following sorting and so the scope of materials subject to the requirements of the WFD would be reduced in comparison to alternative 1 and the costs would also, therefore, be less. Using this approach, reusable products would remain products rather than being classified as waste upon collection.

In relation to data needs, determining waste status at the point of sorting would not assist in reporting by Member States. The current focus of Commission Implementing Decision C(2020) 8976 for reporting on reuse would likely be more difficult as these materials would never reach waste status under this sub-option and Member States may simply determine that such quantities

[15] Communication between the European Commission and RREUSE, November 2022.

should not be reported in the future under the WFD. This would be counterproductive to understanding how the waste hierarchy is being applied in practice for textiles.

Environmental impacts

Changing the point at which separately collected textiles become a waste is somewhat at odds with the definition of waste under the WFD that refers to the intention of the holder to discard a material as determining its waste status.

Additionally, as noted earlier, those depositing textiles are not always able to determine whether a textile is suitable for reuse/recycling or not, which leads to reusable textiles being discarded as waste and non-reusable or recyclable textiles being deposited in separate collection systems. By removing controls that are in place in some Member States where such materials are currently considered as waste as well as the confirmation for all others that such separately collected textiles are not waste is more likely to elevate the risk of waste materials being inappropriately categorised and exported to third countries as a non-waste.

Social impacts

Categorising materials as non-waste at the point of discard would remove waste controls on the materials contained therein. In the context of the potential of waste materials to be mixed in with reusable items and ongoing challenges with the export of unsorted EU textiles to third countries this situation would continue to exist under this option to the disadvantage of the citizens of the receiving countries.

Administrative burden

Removing waste status at the point of collection would remove administrative burden in relation to the need for collectors to obtain the relevant waste management authorisations to collect and sort waste where these are currently applied. There is no standard set fee for the relevant authorisations at the EU level. However, by way of example in DK the annual fee is approximately 200 euro per year[16] and in DE it varies by Lander and by type of waste activity. In Hamburg, for example, the fee varies between 95 and 1 000 euro per year[17]. These fees are likely to be amongst the highest in the EU, with the average likely to sit below 200 euro per year. As a result of a lack of data on the numbers of enterprises concerned it is not possible to quantify the total impact across the EU of removing these licensing costs.

Impact on SMEs and social enterprises

As noted under alternative 1, data from the social enterprise sector[18] indicates that the majority of those involved in the separate collection of wastes, including social enterprises, are already in

[16] https://ens.dk/en/our-responsibilities/waste/danish-national-waste-register
[17] https://www.hamburg.com/publicservice/info/11927315/
[18] Communication between the European Commission and RREUSE, November 2022.

ownership of the necessary waste management permissions so these would no longer be necessary. The same will be the case for SMEs.

Stakeholder evidence

Stakeholder evidence tended not to differentiate between the definition of textiles in general and the definition of textile waste. The stakeholder evidence should be read with this in mind.

Stakeholder feedback generally considered that clarification of definitions was a useful measure, if it includes a clear scope on what products are included – and excluded – in the term "textiles and would help to establish what is to be included in separate collections"[19]. There is not necessarily a need to regulate how collections are carried out, however, a common scope was seen as essential.

If items are thrown away, it was deemed that this should be considered as waste. In some EU states, there is the option of reusable and non-reusable bins for textiles, which often are mixed-up by consumers, so this definition and sorting needs to be carried out by a professional sorter, therefore better labelling and/or definitions might not resolve this. The same respondent considered that over-the-counter donations should also be considered waste because the fact that a product is donated for an economic purpose (potentially ruling it out of being considered waste) is important, but not a determining factor as there is an economic factor behind many choices, including recycling and to align it with economic element would mean nothing would ever be classed as waste[20].

It was stated that it would be useful to align terminology and regulations and provide a common understanding and basis for monitoring which will extend to a much wider set of fibres and products. This should be combined with the JRC work on EoW criteria for textiles to ensure there is a clear definition of what textiles are and when they are waste[21]. It was viewed as critical to establish clarifying definitions on waste and ownership of waste, and to what extend we should export away waste if it can't be recycled - and only focus on exporting to countries that can recycle (keeping in mind the potential decrease for demand in 3rd countries that are developing and the increase in demand for second-hand in Europe)[22].

A stakeholder considered that new terms such as "renewable textiles" may need to be added and these should all be aligned across the states to provide a level playing field. These definitions should extend across new types of materials (i.e., renewable materials) as well as across blends and fibres. The decision as to what this is aligned with should be developed through in-depth consultation with stakeholders[23].

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[19] Interview with Ellen MacArthur Foundation
[20] Interview with Euric
[21] Feedback from workshop
[22] Interview with Teko &
[23] Interview with Euric

It was felt that a clear definition of reusable/recyclable is needed for textiles as currently, no specific criteria exist for an objective classification of discarded textiles into reusable or recyclable. This lack of definitions directly hampers a homogeneous classification of garments and the application of the waste hierarchy. However, once waste is classified as reusable or recyclable, rules for shipment and exports are different regarding controls, notifications and assurance[24].

For all alternatives, there was consensus that any definitions should be cross-state and should drive consistency which will drive ease of sharing, exports, and economies of scale. In addition to this, these definitions should be equally enshrined within all the different EU legislations to ensure shared indicators/reporting and objectives. This should include definitions of legally responsible economic operators as well as business related activities such as repair, remanufacture (remake) and second-hand must also be clearly stated and harmonized within all EU legislations[25] and possible beyond (i.e., Norway)[26].

Bringing the textile labelling and CN classifications together would need to also include definitions for fibre-to-fibre recycling, reusable, recyclable textile waste as well as new terms like ex. renewable textile (post-consumer cellulose-based fibres that can be chemically converted into new fibre types etc). Developing these definitions would need to be done as part of an extensive stakeholder engagement process.

Table 3 : Summary of impacts for measure 1.1 – Alternatives 1-2 definition 'waste'

Stakeholder affected	Economic impacts	Environmental impacts	Social impacts
Producers, waste managers (encompassing collectors, sorters and managers)	This measure would enable a level playing field as it would provide a common understanding of the point at which the application of waste controls apply to textile waste. Alternative 1 would possibly lead to a deterioration in the		Businesses would benefit from the information derived from the clarifying definitions

[24] Evidence from workshop
[25] Evidence from workshop
[26] Interview with Teko & Svenshandel

	quality of textiles collected in the absence of clear instructions as citizens may simply discard all textiles, including waste textiles. It may also require a small number of collectors (including social enterprises) to obtain the relevant waste permits to operate given that the majority already hold such permissions. This measure would increase administrative costs related to verifying compliance with waste definitions, if they are attached to obligations		
Public authorities			Public authorities would benefit from clearer definitions to be applied in managing textile wastes from the public
Producers, waste managers (encompassing collectors, sorters and managers) and citizens			Alternative 1 would offer greater certainty of applying relevant waste management controls to materials that are

			presently lost in the export of EU textiles under the guise of reuse even though they are actually waste. This would be beneficial to third country citizens. Alternative 2 would potentially allow even more EU textile wastes to be exported under the guise of reusable materials even though they are a waste to the detriment of third country citizens.
All stakeholders		Alternative 1 would increase the level of environmental control where these measures are not currently applied. Alternative 2 would lessen controls in comparison to the status quo in terms of environmental protection where most collectors are considered to already apply waste controls under authorisation from public authorities.	

Competitiveness impacts of measure 1.1

The following competitiveness impacts have been assessed for this measure overall.

Table 4 - competitiveness impacts of measure 1.1

Price competitiveness impacts	As noted above under economic impacts an increase in scope in comparison to the scope of textiles currently applied by Member States would lead to increases in costs for management of these types of textiles at the point of discard. The price competitiveness impacts at Member State level are likely to be greatest for those Member States that currently have taken little action to address textile wastes and for which significant investments would be required to catch up. In this context price competitiveness in the textile waste management sectors in BG, CY, CZ, EE, EL, ES, HR, HU, LV, PL, PT, RO, SI and SK would feel the largest impacts given the low levels of collection, sorting and treatment that are currently undertaken in comparison to other EU Member States.
Dynamic competitiveness impacts	A broad scope of textiles under alternative 1 of sub-measure 1.1 would incentivise research and development in particular for those textile goods that have traditionally not been considered as textiles by Member States to date – this would include the likes of pre-consumer textiles and post-consumer goods like carpets and mattresses. Given the low levels of reuse and recycling that have been identified for these types of textiles it would be expected that increased collection would, in turn, increase efforts to reuse and recycled the textiles collected. However, a broader scope also potentially dilutes R&I activities, removing focus from those textiles that represent the bulk of textile wastes and for which greatest economic value may be recovered and requiring focus across all textiles. In this respect alternatives 2 and 3 of sub-measure 1.1. offer the possibility for greater focus of R&I activities in the EU. This offers the opportunity for the EU to become a market leader in textile recycling technologies.
Export competitiveness impacts	Given the high-quality, higher margin and target markets of EU textiles limited export impacts are expected as a result of this measure.
Strategic competitiveness impacts	A broad scope of textiles under alternative 1 of sub-measure 1.1. brings with it a broad scope for which collection would take place and from which increased reuse and recycling would likely take place. This would, from a circularity perspective, allow the potential replacement of

	virgin materials imported from other countries (in particular for natural fibres for which the EU relies on third country imports) with reusable and recyclable fibres from the collected feedstock. Recovery of the full value of these materials would rely on investments in the necessary techniques to recover the materials contained therein – see dynamic competitiveness impacts above for more detail. It has not been possible to quantify the total amounts that may be recoverable. The narrower scope of alternatives 1 and 2 would focus reuse and recycling efforts for the main sources of textile waste in the EU but would offer lower volumes of potential reusable and recycled textiles in the future.

Measure 1.2 – Adopting EU wide waste prevention indicators for textiles

Assessment of impact Measure 1.2

Economic impacts

The EEA is developing a monitoring framework to track waste prevention progress at the EU level. It will be utilised using data that Member States are already collecting and reporting to the Commission under waste and other policies. It will also facilitate the monitoring of waste prevention in the textile sector as part of the efforts of measuring municipal waste reduction. However, it does not cover specific indicators on textile waste specifically. The EEA is currently setting up a reporting system (online tool) for reporting of reused textiles (in line with Implementing Decision 2021/19). Data on reuse will be available from 1 July 2023. It is not expected that developing and using mandatory prevention indicators will require additional reporting from Member States or from the economic operators because specific reporting on textiles is already envisaged under the Implementing Decision 2021/19 which, together with the EEA monitoring framework indicators, would be used as a basis for the development of indicators.

A monitoring framework may be used to identify countries that perform well and good practices/policy measures implemented at national level. Their dissemination would then indirectly contribute to the success of waste prevention measures in the EU27 overall with a consequent reduction of textile waste to be managed by the waste management sector. These impacts cannot be monetised as the impacts in volume terms are unknown.

No impacts on prices of goods are foreseen under this measure as the measure itself looks to share data between Member States on waste prevention using indicators. No additional costs of reporting are foreseen and so no additional costs are required to be priced into the cost of goods.

Environmental impacts

Setting indicators in relation to textile waste prevention approaches adopted by Member States as well as overarching data in relation to the volumes of textile wastes generated, collected, sorted and reused will provide an overview of the progress made by Member States over time in relation to waste prevention using comparable data for the first time. Additionally, such information may be used to identify good performers and to perform further analysis to identify the positive practices implemented by the Member States. This would allow a more objective assessment of Member States' practices as demonstrated by the examples of existing prevention measures in different Member States collected by the European Environment Agency[27]. A list of such examples is provided below, albeit drawing conclusions as to the most successful of these measures is challenging in the absence of an indicator of success, as would be defined under this measure.

Table 5 : Examples of textile waste prevention measures listed in national waste prevention programmes

Information and awareness-raising	Analysis of the textile industry (e.g. textile material flows) **(Austria)**
	Technically ensure the dissemination of information and awareness programmes for a progressive increase in the number of products collected for further use, e.g. textiles, clothing, footwear and other reusable products **(Czechia)**
	Establishment of a voluntary event for selling used clothing before the start of the school year **(Greece)**
Market-based incentives	Reduce value added tax on the repair of bicycles, shoes, leather goods, clothing and electrical appliances, from 25 % to 12 % as of 1 January 2017 in **Sweden** and also in **Austria** from 20 % to 10 % from 1 January 2021
	Reduce cost of repair through a 50 % deduction of labour cost for repairs of textiles through government subsidy **(Sweden)**
	Low value added tax on the repair of clothing, e.g. of 6 % **(Belgium)**
	Reduction in patent taxes for small businesses whose activities lead to the reuse of a product (e.g. repair of shoes, furniture and clothing) **(Bulgaria)**
	Work to establish environmental targets for public procurement of textiles and textile services **(Denmark)**
Voluntary agreements and	Partnerships with vendors to increase the market share of eco-labelled textiles or textiles that contain a minimal amount of harmful

[27] EEA report No 15 2021. Progress towards preventing waste in Europe – the case of textile waste prevention

cooperation platforms	substances **(Iceland)**
	A partnership with companies and organisations with the slogan 'Give your clothes a longer life' **(Denmark)**
Regulatory measures	Support stricter international regulations regarding the use of chemicals in textiles **(Norway)**

Source: EEA, 2021.

Developing indicators that allow waste intensity to be determined i.e., illustrating the decoupling of textile waste generation both in relation to textiles sold but also in relation to economic growth using statistics already available from Eurostat would act as a good marker to demonstrating progress in textile waste prevention. Using statistics on the environmental costs of textile production and disposal available from the likes of Payet[28] and applying data from Eurostat, calculation of the impact of preventing textile waste production on the estimated CO2e emissions from placing textiles on the EU27 market, which was estimated in 2020 as 198 million metric tonnes[29] and its reduction in impact in the future should be possible to be calculated.

Social impacts

Waste prevention is at the top of the waste hierarchy as the avoidance of generation of waste in the first place is the preferred option. Monitoring progress on textile waste generation and identifying best practices employed by Member States should subsequently allow to determine the extent to which the social impacts of textile waste can be addressed by reducing those wastes in the first place.

As noted under economic impacts, a reduction in waste through more effective monitoring of waste prevention measures would result in less waste being generated and consequently an impact on employment in the waste management sector would be likely, albeit small in comparison to the waste management sector overall.

Impact on SMEs and social enterprises

No significant impacts on SMEs were identified for this measure. SMEs, including social enterprises, are the majority of those involved in the placing on the market of textiles (including used, repaired textiles) as well as in separate collection, sorting of wastes. The purpose of the waste prevention monitoring is to identify practices and actions that have a waste reduction impact and facilitate their use further. Therefore, in the context of applying waste prevention measures as required under Article 9 of the WFD, Member States should facilitate the creation of

[28] Payet, J. 2021. Assessment of Carbon Footprint for the Textile Sector in France. Sustainability 2021,13, 2422.
[29] European Commission, Joint Research Centre, Donatello, S., Danneck, J., Löw, C., et al., Circular economy perspectives in the EU textile sector: final report, Publications Office, 2021, https://data.europa.eu/doi/10.2760/858144.

circular business models, support those with regulatory and economic measures. In view of the composition of the sector, this would benefit the SMEs and social enterprises.

Stakeholder evidence

Stakeholder insight described EU waste prevention indicators as essential in confirming commitment to goals and setting out a direction of travel for textiles waste management[30]. Concerns were raised however, over the potential for prevention targets to create challenges for reuse, by causing confusion between "old" and "new" products, and not doing enough to drive activity further up the waste hierarchy[31]. The optional measures could also be challenging to implement uniformly and could potentially have disproportionate impacts across areas. Concerns were also raised around the complexity of using preventative indicators which could lead to incentivisation of malpractice[32].

Feedback suggested that the WFD should go beyond indicators to include quantitative targets for preparation for reuse and waste prevention, separate to recycling. This should further encourage reuse by providing economic incentivisation for reuse operators who meet waste prevention targets, particularly social enterprises[33]. Whilst the waste prevention indicators in themselves would not be enough to drive action at company level, the impact from administration should act as a catalyst to drive action. The administration required for reporting should then be aligned with the ESPR and embedded into a Digital Product Passport[34].

Insight gathered through interviews and workshops highlighted that the waste prevention angle is not the fundamental point to focus on, as what is needed is strong infrastructure which can sort and collect textiles to retain their value. It was felt that the focus should be on investing in technology which can expand the capacity to upscale and increase the volumes of products able to be accepted beyond simply high value used products[35]. Prevention of waste should be driven through a wider set of enablers, including better materials and production processes, and fostering of reusability and repair to involve consumers[36].

Where the indicators are established, stakeholder input suggested that full life-cycle data should be used to design the most environmentally friendly systems and indicators which fully reflect the most desirable outcomes. This should include impacts from transporting, processing and production for recycling and reuse[37].

Administrative burden assessment

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[30] Evidence from workshop
[31] Interview with RREUSE
[32] Interview with ARTSHC
[33] Evidence from stakeholder interview with Ellen MacArthur Foundation
[34] Evidence from stakeholder interview with Policy Hub
[35] Evidence from the first stakeholder workshop
[36] Evidence from the first stakeholder workshop
[37] NGO input in first stakeholder workshop

There would be no additional administrative burden from this measure beyond those identified in relation to the application of measure 2.14.

Table 6 : Summary of impacts for measure 1.2

Stakeholder affected	Economic impacts	Environmental impacts	Social impacts
Producers, waste managers (encompassing collectors, sorters and managers)	Greater efficiencies identified through better monitoring should lead to more focussed and efficient efforts in relation to waste prevention. Minor impacts on the economics of the waste management sector are foreseen.		This measure would increase information on waste prevention measures available publicly
Public authorities	The ability to judge the impacts of waste prevention measures employed through a consistent indicator will allow Member States to more accurately assess the effects of their own programmes as well as those of other Member States. Reduced cost of waste disposal as indicators would help reaching waste prevention targets more efficiently.		This measure would increase information on waste prevention measures available publicly
Public authorities and citizens		This measure would help reaching climate neutrality	Greater awareness of the measures taken by Member

		targets as indicators would support improved waste prevention. It would help improving air, soil, and water quality as indicators would support improved waste prevention. It would help protecting landscapes and improvement ecosystem services as indicators would support improved waste prevention.	States to prevent waste within the territory concerned.

Impacts on competitiveness

The following impacts on competitiveness have been assessed under this measure.

Table 7 - impacts on competitiveness of measure 1.2

Price competitiveness impacts	No specific impacts of price competitiveness have been identified under this measure.
Dynamic competitiveness impacts	This measure has the potential to incentivise the repair and reuse market in Member States as one aspect of waste prevention that may be applied by Member States.
Export competitiveness impacts	Waste prevention measures are likely to reduce the volumes of used textiles exported from the EU to third countries. This would potentially reduce the incomes of used textile exporters within the EU as whole due to the reduced volumes available to market.
Strategic competitiveness impacts	Waste prevention measures offer the possibility to reduce the need for imports of textiles in the future as greater reuse and repair within the EU replaces the need for new textile goods to be purchased.

Measure 1.3 – Providing Member States with guidance and support in dialogue on the management of textile waste between actors involved

Assessment of the impact Measure 1.3

Economic impacts

The sharing of best practice and knowledge through both guidance and a platform would be expected to have positive impacts for textile management stakeholders. Guidance documents can help competent authorities and other stakeholders to improve practices in relation to waste management. To produce such guidance documents, the Commission will need to identify best practice and disseminate the information to the key EU stakeholders in all EU languages.

The measure would raise awareness of circular textiles models with the most potential for growth. The Commission SWD accompanying the proposal for a Regulation establishing a framework for setting ecodesign requirements [38] shows that 9% of SMEs have already adopted Circular Business Models, and on average 20% of businesses are already familiar with Circular Business Models. With the support from the public sector, there are good reasons to believe that circular economy business models will continue to increase in relation to textiles via the sharing of practices. The SWD also notes that recent trends suggest that demand for Circular Business Models will continue to grow in future years, pushed by significant policy measures at EU and Member States level, as well as generational trends and a growing appetite for sustainable products. Generation Z and Millennials are notably boosting demand for refurbished products and easy reparability options.

The measure has the potential to significantly increase textile collection, sorting and subsequent treatment based on the sharing of practices that have been proven to work by frontrunners such as DE and SE who currently collect over 60% of waste clothing and household textiles in relation to collection schemes. This would be of greatest benefit to those Member States that are far behind such collection rates including BG, CY, CZ, EE, EL, ES, HR, HU, LV, PL, PT, RO, SI and SK. However, as the sharing of best practice does not require Member States to then implement such practice the precise impacts in terms of flows of textile waste, collection, sorting and treatment is difficult to quantify. An improvement in such processes would, however, be expected to be achieved.

Any additional collection, sorting and treatment performed as a result of the application of this measure would entail costs. In countries where EPR applies or is planned to apply then the costs would fall on the producer. Producers would either have to absorb those costs that would lower their profitability or increase the costs to consumers of the products themselves. Where EPR is not applied then costs may be met via the likes of disposal fees applied at the point of disposal or general taxation. However, these costs would be a fraction of waste generated and collected, and consequently the costs that would be applied would not be for the entire volumes of textiles

[38] SWD(2022) 82 final

collected, sorted and treated but rather the additional costs for the additional wastes collected. Given that the total costs for all wastes account for an approximate increase per product of around 0.6%, this measure would likely result in smaller overall costs per product. Should the additional collection equate to a 20% increase in the waste collected, for example, then the application of costs to all goods sold would result in an increase in costs per item of around 0.12% of total price.

Environmental and Social impacts

Positive environmental impacts would stem from the sharing of best practices that could improve textile waste management across the EU. Social impacts are also likely to be positive since moving textile waste management up the waste hierarchy will generate more jobs that require skilled staff, particularly in the reuse sector where a lack of technical knowledge on repair and understaffing have been identified[39].

Administrative burden

The provision of guidelines can be managed internally by the Commission or externalised to an agency or a contractor. The costs to create the additional guidance would include the travel and event costs, i.e., the cost of holding any necessary guidance development meetings and developing the guidance. Additional to this, the cost of the staff necessary to draft the reports would need to be added. Considering the ToRs used by IMPEL in the development of their own Guidance on Effective Waste Shipment Inspection Planning, the total cost of all meeting events for detailed guidance would be approximately 135 000 euro per guidance with about 50 individuals from multiple organisations making input encompassing time and travel costs for the staff involved in the development of the guidance.

The costs associated to the set-up of a platform depends very much on the final scenario selected. If the platform takes the form of an online platform only, managed as part of a wider dissemination activity following the Ecodesign website model, it is likely that the administrative cost will be limited to the cost of Commission personnel for both the extra development of the platform and its population and updates.

Impact on SMEs and social enterprises

Given SMEs, including social enterprises, are the majority of those involved in the placing on the market of textiles as well as in separate collection of wastes, the guidance and support platform would have the largest impacts on SMEs overall.

Stakeholder evidence

In the second textiles stakeholder workshop this measure was seen as a useful tool for providing organisational information which could help users design effective collection schemes and create

[39] SWD(2022) 82 final

shared learnings, which can help 'level the playing field'. This was identified as a critical element – along with clearer definitions (see Measure 1.1) and EU wide end-of-waste criteria for textiles – in developing a clear framework across member states and it was suggested during the interview that some of the measures be grouped to increase cumulative impact. This could be particularly useful if implemented early, to drive cohesion before individual systems are established.

Without a mandate, this measure will not be enough to ensure consistency in EPR systems for textiles, with Member States likely to develop their own potentially diverging guidance, and organisations historically driven by profit rather than environmental impact dominating discussions[40]. In the absence of guidance and a platform to share information, there is a risk of substantial administrative burdens, particularly for obligated producers[41]. It is important that, to operate efficiently, PROs must collaborate and share policy recommendations with one another as well as with the European Commission to ensure co-ordinated approaches and investment[42].

Where different systems operate, there is likely to be a lack of incentive for investment in R&D since fragmented policies would lead to inefficiencies[43]. Non-harmonisation is also likely to have cost, time and labour implications as different reporting and fee systems overlap across boundaries[44]. Clarifying definitions, developing guidance and the sharing of stakeholder experience and EU wide end-of-waste criteria for textiles, when combined, could drive simplification and harmonisation which would simplify shipping and exporting and potentially encourage investment[45].

To avoid competition between the reuse and preparing for reuse sectors, several stakeholders requested that an impact assessment must be carried out in the development of EPR schemes to identify measures to avoid the two competing. This was raised within the interviews, during which stakeholders outlined that different EPR systems across the EU would struggle to drive economies of scale needed for recycled content[46].

Table 8 : Summary of impacts for measure 1.3

Stakeholder affected	Economic impacts	Environmental impacts	Social impacts

[40] Evidence from workshop
[41] Evidence from workshop
[42] Evidence from workshop
[43] Evidence from workshop
[44] Evidence from workshop
[45] Interview with Eurocommerce
[46] Interview with Policy Hub

Public authorities	This measure would imply resourcing and related costs to develop a guidance document on best practices for EPR, as well as wider textile waste management techniques. The operation of a stakeholder platform would also carry some administrative burden. A cost of 135 000 euro per piece of guidance developed would apply. It would reduce costs related waste disposal because it would encourage sustainable production practices. This measure would improve knowledge thanks to sharing best practices and development of guidance documents.		
All stakeholders		This measure would help reaching climate neutrality targets and help improving air, soil, and water quality. This measure would indirectly lead to more sustainable	The sharing of best practice for those parts of the textile management stream that have been identified as particularly challenged e.g., repair and reuse

		production and consumption patterns through the increased know-how.	could assist in stimulating employment in the activities concerned through the sharing of best practice.

Impacts on competitiveness

The following impacts on competitiveness have been assessed under this measure.

Table 9 - impacts on competitiveness of measure 1.3

Price competitiveness impacts	Impacts of price competitiveness are linked to the possible increases in collection, sorting and treatment as described under economic impacts above. In this respect, those Member States that currently collect a small share of textile wastes and have little capacity for sorting and treatment would be most likely impacted with costs falling on the waste management sectors in each of those Member States accordingly. This would particularly impact BG, CY, CZ, EE, EL, ES, HR, HU, LV, PL, PT, RO, SI and SK.
Dynamic competitiveness impacts	This measure has the potential to share best practices and improve research and development in a coordinated manner by bringing information and Member States together to discuss the practices and processes applied and in development. The measure is also likely to incentivise the repair and reuse market in Member States as one aspect of waste prevention that may be applied by Member States and addressed under this measure.
Export competitiveness impacts	Waste prevention measures are likely to reduce the volumes of used textiles exported from the EU to third countries. This would potentially reduce the incomes of used textile exporters within the EU as whole due to the reduced volumes available to market.
Strategic competitiveness impacts	This measure offers the opportunity to reduce the need for imports of textiles in the future as greater reuse and repair within the EU replaces the need for new textile goods to be purchased and improvements in recycling reduce the need for imports of virgin textile materials – in particular natural fibres for which the EU relies heavily on third country imports.

Option 2: Setting additional regulatory requirements to improve performance

Measure 2.5 – Setting sorting obligations for separately collected textiles and textiles waste

Assessment of impact Measure 2.5

Economic impacts

Additional sorting would ensure that greater volumes of textiles are removed from the mixed waste stream and processed for reuse and recycling for either onward sale within the EU or export for sale to third countries in the case of reuse or as feedstock for textile recycling.

According to current baseline predictions approximately 1.879 million tonnes of additional textile sorting would be undertaken within the EU by 2035 encompassing both the envisaged growth in separate collection of 1.4 million tonnes as well as the approximately 475 000 tonnes of textiles sorting that is currently undertaken in third countries and that is expected would take place within the EU under this measure. This would have the potential to lead to an additional 702 000 tonnes of textiles separated for reuse with an estimated value of 534 million euro per year and 590 000 tonnes available for recycling with an estimated value of 117 million euro per year. At the same time, additional sorting and subsequent treatment carries with it additional costs. An additional sorting capacity along with subsequent treatment (preparation for reuse, closed loop and open loop recycling) would carry operational costs of approximately 913 million euro per year by 2035 with 20% of this cost attributable to collection and 80% to the subsequent collection and treatment. Additional minor operational costs would be necessary to implement the required criteria in the sorting process. Given the flexibility that would be provided to Member States in the application of these criteria it is not possible to provide a definitive cost. This means that in general approximately 70% of the costs of application of the measure would be likely retrieved via the economic value of the textiles sorted.

The additional sorting and treatment performed as a result of the application of this measure would entail costs. In countries where EPR applies or is planned to apply then the costs would fall on the producer. Producers would either have to absorb those costs that would lower their profitability or increase the costs to consumers of the products themselves. Where EPR is not applied then costs may be met via the likes of disposal fees applied at the point of disposal or general taxation. However, these costs would be a fraction of waste generated and collected, and consequently the costs that would be applied would not be for the entire volumes of textiles collected, sorted and treated but rather the additional costs for the additional wastes collected. Given that the total costs for all wastes account for an approximate increase per product of around 0.6%, this measure would likely result in smaller overall costs per product as the additional amount of sorting and treatment infrastructure in comparison to the baseline would be approximately half of the total necessary infrastructure that would already be in place. Consequently, and recognising that the full costs of the necessary increases infrastructure could be applied across all produced textile goods (and not just the fraction that would be additionally sorted and treated) an increase in costs per item of around 0.3% of total price is estimated to result from this measure.

The actual replacement of virgin textile materials by their recycled equivalent is particularly challenging to calculate. This is because the ability to recycle textiles is very much dependent upon the materials within the textile products, the presence of disruptors, colour of the textiles and other variables. In its study on the technical, regulatory, economic and environmental effectiveness of textile fibres recycling[47], the European Commission identified that mechanical recycling leaves 5-20% of the input fraction as spinnable fibres for natural fibres and 25-55% in the case of polycotton or polyester. However, it is acknowledged that the quality of these fibres is lower than the quality of virgin fibres. In the case of thermal recycling for synthetic fibres, the recycled polymers are mixed with virgin material to produce new fibres. Full fibre recycling is not yet possible. Similarly, chemical recycling of cotton results in materials that are generally blended with virgin materials, whereas for PA6 and PET monomer, recycling can result in high-purity virgin grade PET and inputs for virgin grade PA6. Whilst it is clear that recycling of textiles will result in the replacement of virgin textile fibres with subsequent economic and environmental benefits resulting from such recycling the volumes of displacement are highly uncertain. Using a basic assumption that between 20 – 50% of the volumes available for recycling being replace virgin fibres would result in 118 000 to 295 000 tonnes of virgin fibres would be replaced by recycled fibres under this measure.

Waste management operators that are reliant on disposal revenues for textiles would face a reduction in revenues from less textile waste being sent to disposal. With the expected increase in collection under the baseline and the obligation for sorting under this measure the result would be a diversion from landfill of approximately 530 000 tonnes per year by 2035. Several Member States also impose both an incineration and a landfill tax. Therefore, the reduced tonnage of waste sent for disposal would also lead to a reduced tax revenue. Using an average landfill tax revenue of 50 euro per tonne[48] revenues for waste management operators would fall by approximately 26.5 million euro per annum by 2035. On the other hand, many Member States are increasing their per tonnage rates of these taxes to promote recycling.

The sorting operators also will incur costs to monitoring and adapting their practices to ensure that their sorting protocols (i.e. the granularity of sorted fractions for re-use) are adapted to the specific re-use markets in the countries where their produced sorted textiles may be shipped to. Therefore, information will need to be generated and kept for inspection to demonstrate how the sorters have identified the needs of the receiving re-use markets and adapted their sorting protocols to respond to those findings. There are re-occurring (depending on the amount of traders used by the sorters) costs to the sorting facility operators (to note that under measure 2.9 this cost is due to producers subject to an extended producer obligation) to gather data about the

[47] European Commission, 2021. Study on the technical, regulatory, economic and environmental effectiveness of textile fibres recycling

[48] CEWEP collects information on the landfill taxes applied in different Member States that can be found here: Landfill-taxes-and-restrictions-overview.pdf (cewep.eu) the values range from €5 per tonne to over €100 per tonne with four Member States imposing no landfill tax. The value of €50 per tonne has been taken as an approximate average tax for the purpose of this assessment.

countries (including third countries) where textiles are exported for reuse and an analysis of data and subsequent adaptation of the facilities' sorting protocols and training of sorting staff to adapt to the new sorting protocols. This entails gathering information from their trading partners where their textiles are being shipped to, which can be attained through contractual means.

The adoption of an implementing act in the future by the Commission would facilitate the monitoring and enforcement activities of the competent authorities since a more detailed set of requirements would provide more clarity on the regulatory expectation. It would also facilitate the compliance costs for economic operators as it would ensure a level playing field across the EU and entities that operate in several countries.

This obligation would be enforced as part of the other permitting requirements for the sorting facilities; therefore, allowing for synergies with the existing enforcement processes. Depending on the national permitting and registration systems, the permitting or registration conditions for sorting operators may need to be revised. There may be need for additional staff to perform such inspections as well as operator time to assist in such inspections. It is assumed that, as part of the existing national inspection policies for the permitting processes, the inspections of the requirements in this measure, would take place once every three years and entail three days of effort on behalf of competent authorities entailing preparation for the inspection, undertaking the inspection and recording the results of the inspection.

- One day of assistance per operator per inspection would be required.
- The annualised costs per inspection would be approximately 208 euro per competent authority and 78 euro per operators for the additional inspection.

Importers in third country businesses that currently manage unsorted textiles - exported outside the EU as non-waste - and that perform preparing for reuse activities, are likely to receive less unsorted waste in the future. They would receive unsorted textiles classified as waste and therefore would need to abide by waste rules in carrying out sorting activities which would increase costs. However, the sorted textiles, meant for reuse that they will receive are expected to be more suitable for their market and this should contain limited amounts of waste, reducing the costs of disposing it in an environmentally sound manner.

With regard to pre-consumer textiles, the different fractions of textiles materials and textiles items would be required to be kept separate at the point of waste generation in order to facilitate subsequent preparation for reuse or recycling and subject to recovery operations. This may require changes to the way in which wastes are separated at the point of generation and collected by waste operators. Whilst the volumes of waste being generated would not change, the manner of their storage and collection would change. This may, in turn, generate some small additional costs to enact.

Environmental impacts

Requiring sorting is likely to have two main environmental impacts. Firstly, an obligation to sort textiles in order to export them for reuse, would assist in the strong reduction of textiles that are not actually reusable (i.e., they are waste) as these would either be retained within the EU and be

disposed of or would be exported unsorted (i.e., as waste) and subject to the requirements of the WSR. The negative impacts of the materials that are in fact waste and are currently exported as reusable textiles would, therefore, be mitigated. Secondly, an obligation to sort textiles according to EU wide criteria is likely to result in a more consistent sorting process that maximises reuse and recycling of textiles in the first instance, ensuring that a greater volume of textiles are managed higher up the waste hierarchy and, as a result, the environmental impacts of those materials are mitigated to the extent possible.

The effect of displacement of new textiles by reused textiles is also likely to take place. However, there is little certainty as to the level of displacement that would take place. In an assessment of the environmental benefits of reusing clothes[49] Farrant et al examined the displacement of new clothing purchases through second hand clothing sales and found that the purchase of 100 items of second-hand clothing was estimated to reduce the purchase of between 60 and 85 virgin clothes, depending on the place of reuse. At the same time, however, it is important to note that only approximately 15% of clothing suitable for reuse following separate collection in the EU is actually reused within the EU, with the rest exported to third countries for reuse. Consequently, the effect of increased sorting and reuse within the EU on sales of new textiles equivalents is likely to be limited. Using the lower estimate of Farrant et al of 60 percent replacement and the changes in sorting and reusable fractions foreseen under this measure the additional volume of displacement would be approximately 58 500 tonnes by 2035, or approximately a 1% effect on new textile sales in the EU. A displacement effect outside of the EU is also possible but given the wide variety of nations that receive EU used textiles the effects in those recipient countries cannot be quantified.

Additionally, the recycling of textiles would replace some virgin fibre production with recycled fibres. As noted under the economic impacts using a basic assumption that between 20 – 50% of the volumes available for recycling would replace virgin fibres would result in between 118 000 tonnes and 295 000 tonnes of virgin fibres being replaced by recycled fibres under this measure. Under such circumstances the environmental impacts of virgin fibre production would be avoided. McKinsey[50] uses values from the Stockholm Environmental Institute to calculate land use for the production of virgin fibres whereby ~2 hectare per tonne of fibre output as an average all fibres is applied to calculate the land-use saved through displacement of virgin fibres by recycled fibres. Additionally, McKinsey calculates water consumption of approximately 600m^3 per tonne of fibre output using data from Mistra Future Fashion which in itself summarises various data points. Applying the same values to the potential savings in virgin fibre production calculated under this measures would result in land use savings of between 236 000 hectares and 590 000 hectares and water savings of between 71 million and 177 million m^3 per year.

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[49] Farrant L, Olsen S and Wangel A, 2010. Environmental benefits from reusing clothes published in the International Journal of Life Cycle Assessment

[50] McKinsey & Company, 2022.

The volume of textiles exported from the EU to third countries each year was predicted in the Commission Impact Assessment accompanying the proposal to amend the WSR[51] that indicated that exports beyond 2030 would equate to over 2 million tonnes. As noted under the impacts for measure 2.8 that looks at waste shipment practices in the main receiving countries of EU textile waste, the recycling infrastructure in those countries is limited and high levels of landfilling and open dumping of waste is prevalent. Using a conservative estimate that 8% of the materials sent to third countries that is disposed could otherwise have been recycled would entail a reduction in CO2e emissions of approximately 160 000 tonnes per year equalling 16 million euro year of environmental damage avoided by greater recycling by 2035. Additionally, impacts from the release of pollutants due to incineration and / or landfilling in third countries would be avoided, including air pollution, water and groundwater pollution and release of microplastics.

The expectation is that exports of textiles that are not actually reusable (i.e. they are waste) will be retained within the EU and managed accordingly or exported outside the EU for further treatment in accordance with the Waste Shipment Regulation which once the recast regulation enters into force will entail a verification mechanism that waste is exported only to those countries that have an appropriate waste management policy and infrastructure that ensures an equivalent treatment requirements for the waste than in the EU. The negative impacts of the materials that are waste and are exported at present would therefore be mitigated.

Social impacts

Setting sorting requirements would be expected to lead to additional employment in the sorting, the reuse and further treatment of materials sectors, in the EU or in third countries. Whilst it is difficult to determine the downstream processing employment that would result, in terms of sorting capacity alone, 8 740 jobs are expected to be created to handle the increase in textile waste generation foreseen.

Additionally, the social impacts of textiles waste in third countries is emphasised in the Commission's Staff Working Document accompanying the ecodesign proposal[52] that notes that garments exported for reuse often end up being burnt, which impacts the local environment and inhabitants as developing countries generally do not have the suitable infrastructure to discard them safely. The same SWD quotes that 40% of the clothing traded at the Kantamanto Market (Ghana) ends up in landfill almost immediately due to its poor quality. McKinsey[53] also notes that exports of used clothing and household textiles to third countries are partly legitimate and aligned with the waste hierarchy as some goes to reuse. However, McKinsey also identifies that there is simultaneously a large problem with textile-waste management, especially in some of the Global South countries to which European textiles are exported—particularly the exports of unsorted textile waste as many of these countries do not have the capacity to recycle this waste, and, as a consequence, much of it ends up in landfills or incineration. Whilst several NGOs have

[51] SWD(2021) 331 final
[52] See footnote **Error! Bookmark not defined.**
[53] See footnote 46, p. 47.

highlighted the challenges resulting from exports of textile from the EU to third countries Greenpeace[54], the Plastic Soup Foundation[55] and the movie 'Textile Mountain'[56], the challenges of fast fashion have also been acknowledged by UNEP[57] and the OECD[58] at the end of textile life. The export of these quantities also leads to additional transport, further weighing down on the environmental impact of textiles. Ensuring that better sorted textiles are sent to third countries for reuse should add to the value of those exports and to those receiving them in third countries whilst negating the waste management costs that currently arise through the contamination of reusable textiles with waste.

The further targeting of textile wastes sent to such third countries would undoubtedly reduce the volumes of materials dumped and open-burned in such a manner, having a positive impact on the social wellbeing on people in proximity to such waste sites as well as in relation to the health and safety of those currently involved in such waste management activities. Conversely, however, the employment of those currently involved in sorting textiles in third countries may be negatively impacted from an economic standpoint as sorting may instead be taking place within the EU (otherwise the requirements of the WSR would apply to protect workers in the country of receipt). It has not been possible to quantify the number of jobs that would be impacted but the number would almost certainly be higher than the number of additional jobs expected to be generated within the EU through additional sorting as a result of the more automated sorting practices that take place within the EU in comparison to third countries.

Finally, as noted in the Commission Staff Working Document accompanying the proposal for a Regulation establishing a framework for setting ecodesign requirements for sustainable products[59] workers in third countries are most often not protected against the health risks related to the pesticides and chemicals involved in the production of cotton and cotton products, as they generally work without a contract and / or without social security benefits[60]. With a salary below the minimum wage, workers can barely afford housing, food, education, and medical treatment.

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[54] Wohlgemuth V (on behalf of Greenpeace), 2022. How Fast Fashion is using the Global South as a dumping ground for textile waste https://www.greenpeace.org/international/story/53333/how-fast-fashion-is-using-global-south-as-dumping-ground-for-textile-waste/

[55] Plastic Soup Foundation, 2022. Come on EU! The massive dumping of discarded clothing in Ghana and Chile must stop https://www.plasticsoupfoundation.org/en/2022/03/the-massive-dumping-of-discarded-clothing-in-ghana-and-chile-must-stop/

[56] Fellipe Lopes, 2020. Textile Mountain: The Hidden Burden of our Fashion Waste https://www.textilemountainfilm.com/

[57] UNEP, 2018. Putting the brakes on fast fashion. https://www.unep.org/news-and-stories/story/putting-brakes-fast-fashion

[58] OECD, 2022. Global Plastics Outlook. https://www.oecd-ilibrary.org/environment/global-plastics-outlook_de747aef-en

[59] SWD(2022) 82 final

[60] Cité des Sciences et de l'Industrie & ADEME, Jean, Exhibition from 8 December 2020-22 January 2022. Visited on 22 June 2021

Child labour is also common across the production line, because of the strong demand for cotton and garments, poverty, and weak legislation[61].

Impact on SMEs and social enterprises

Given the majority of those involved in collecting textiles and their subsequent sorting are SMEs and social enterprises as well as some commercial SMEs the obligation to make sure that textiles are sorted would generally fall on these enterprises, without prejudice to Member State right to engage other actors in implementing the separate collection obligation, including public waste management entities, and measure 2.9 in this initiative. As noted above, with increasing sorting, the revenue from reuse and recycling is also likely to increase to partially offset the additional costs that will be required to implement the sorting requirements. This additional cost incurred by the sorting operators would bring economic benefits to operators placing used textiles on the market or producing textiles using recycled textiles due to the economies of scale that would reduce the cost and improve the consistency and availability of these materials of high quality. The additional costs of meeting the sorting criteria are expected to be minor where measure 2.9 (EPR schemes for textiles) is in place and would facilitate their operations since the cost of managing residual waste is assigned to the EPR.

An additional 0.5 FTE would be required within the European Commission to adopt the necessary implementing act setting out harmonised sorting requirements for re-use and recycling.

Stakeholder evidence

Stakeholders focused on two key challenges in relation to sorting. Textile value chain representatives[62] considered that a lack of harmonization for sorting criteria and fragmentation of the sorting market at the EU level hinder large scale circulation of used textiles and textile wastes. Industry representatives indicated a particular challenge is the cost of manual sorting and the lack of automated sorting technologies. All stakeholder groups have recognized the available information by NGOs that place unsorted or badly sorted textiles in the EU as one of the culprits of unsustainable textile waste management in the third countries.

Table 10 : Summary of impacts for measure 2.5

Stakeholder affected	Economic impacts	Environmental impacts	Social impacts
Producers, waste managers (encompassing collectors, sorters and	More textiles available for reuse with an additional value of 534 million		

[61] International Labour Organisation, 2016. Child labour in cotton: a briefing
[62] Policy Hub, Circularity for Apparel and Footwear

managers)	euro by 2035. More textiles available for recycling with a value of 117 million euro per year. Less waste sent for disposal affecting waste disposal operator income and Member State tax revenue and costs for re-use operators, in particular, in third countries.		
Public authorities	Additional costs for sorting waste, predicted to total an additional 913 million euro by 2035. This measure would create administrative burden on public authorities to revise, where necessary, monitor and enforce specific permitting requirements for sorters. Reporting by waste managers is considered already as part of current practices in Member States.		Additional data on volume sorted and volume of separately collected waste.
Citizens			More sustainable consumption of textile goods, as consumers would be exposed to

			broader availability of used textiles and more sustainable textiles.
All stakeholders		Less unsorted textiles and better sorted textiles exported to third countries, reducing pressures on the local infrastructure and avoiding disposal of textile waste that ends up being treated in poor waste management systems. Lower emissions and contribution to GHG reduction targets as sorting requirements would decrease the amount of textile that is landfilled. This measure would improve air, soil, and water quality thanks to reduced waste disposal practices. Similarly, it would protect landscapes thanks to reduced landfilling.	Better public health and safety, as sorting obligations would decrease the amount of textile that is landfilled, and/or poorly managed outside the EU, leading to a reduction in pollution.

Impacts on competitiveness

The following impacts on competitiveness have been assessed under this measure.

Table 11 - impacts on competitiveness of measure 2.5

Price competitiveness	The largest price competitiveness impacts are likely to be felt in those

impacts	Member States that have significant levels of collection but low levels of national sorting capacity as the need for additional sorting capacity under this measure potentially drives up competition for the sorting capacity available. In this respect AT, DE, DK, IT, and SE would be likely to note the largest impacts on price competitiveness as these countries currently have a heavy reliance on sorting taking place in other countries where lower costs are likely to be a factor in their shortages in their own domestic sorting capacity. At the same time, the possibility exists for other Member States to expand their sorting capacity, a significant part of which is already related to imported discarded textiles from other Member States and third countries, and increase their price competitiveness. This would include BG, CZ, EE, HU, LT, LV, PL, RO and SK.
Dynamic competitiveness impacts	A greater amount of sorting taking place within the EU under this measure would drive greater levels of reuse and recycling within the EU of the textiles sorted. In turn, this should drive greater R&I activities in the EU to deal with the reusable and recyclable textiles derived from sorting. This offers the opportunity for the EU to become a market leader in textile recycling technologies.
Export competitiveness impacts	Waste sorting measures are likely to reduce the volumes of used textiles exported from the EU to third countries, particularly as more material are collected for recycling within the EU. This would potentially reduce the incomes of used textile exporters within the EU as whole due to the reduced volumes available to market whilst increasing the volumes available for EU textile recyclers.
Strategic competitiveness impacts	Waste prevention measures offer the possibility to reduce the need for imports of textiles in the future as greater reuse, repair and recycling within the EU replaces the need for new textile goods to be purchased and for the import of natural textile fibres for use in the production of EU textile goods. As noted under economic impacts above in between 118 000 tonnes and 295 000 tonnes of virgin fibres could be replaced by recycled fibres under this measure.

Measure 2.6 – Adopting end of waste criteria

Assessment of impact Measure 2.6

Economic impacts

Minimising divergence of approaches to end-of-waste criteria ensures a level playing field and provides the opportunity to ensure that sorted textiles for re-use are fit for re-use and there is consistency in the sorting outputs for the variety of re-use markets. The criteria would have a notable benefit for the textile recycling sector by ensuring sufficiently consistent feedstock from the sorting processes as input to the recycling processes and the certainty of a product status for the outputs of recycling. This certainty would foster recycling techniques that are dependent on a sufficiently defined supply of materials to reach commercial viability in the future. This would encourage investment in infrastructure projects and promote a market for high quality secondary textile materials. This would also ensure a level playing field for the operators based in different countries to avoid distortion of competition which could otherwise create more favourable circumstances for companies, for example, that are operating in countries with national end of waste criteria. However, given the precise scope of the textiles that may be impacted by the final end-of-waste criteria is unknown it is not possible to state with certainty the changes in flows by volume that would actually take place. However, as a result of materials reaching end of waste status the costs of managing those materials is likely to reduce, albeit by a relatively small amount. The extent to which these savings may be passed on to consumers is unknown, and in reality it is likely that any savings will be felt by businesses rather than directly by consumers of textile goods. This would, in turn, not result in a change in prices to consumers but may result in an increase in profitability for the reuse and recycling sector within the EU

The JRC[63] notes that for certain wastes, end-of-waste criteria can promote the production of higher quality secondary products by defining technical and environmental minimum requirements to be fulfilled by the materials. Information on the product characteristics facilitates their comparison, enhance the final quality of the final product and may alleviate user prejudice. These would all lead to an increase in their demand and their recycling rates.

This echoes messages identified in relation to end-of-waste criteria for other wastes including metal scrap[64]. Harmonised EU criteria would ensure free movement of textile materials within the EU as intra-shipment will no longer be in relation to a waste but will be in relation to a textile material that is no longer waste.

Textiles come in a variety of types of material and scope of application. It is expected that end-of-waste criteria will need to be developed for this broad family of materials over time and developing end-of-waste criteria may be delayed for certain textile materials whilst priority textiles are initially addressed. This would allow investment to be focussed on the most environmentally important textile wastes in the first instance and to be addressed more efficiently than is presently the case.

Certainty on the end-of-waste status for sorted re-usable textiles exported outside the EU would positively impact the re-use operators as it would reduce their waste management costs since the

[63] JRC 2009. End-of-waste criteria.
[64] UBA and Arcadis, 2020. Study to assess Member States practices on by-product and end-of-waste

potential waste fraction within the textile bales would be minimised through more rigorous sorting in the EU (this is the combined impact of measures 2.5, 2.6, 2.8).

Environmental impacts

Article 6 of the WFD makes clear that end-of-waste can only apply if the use of the substance or object will not lead to overall adverse environmental or human health impacts. In keeping with this provision it is considered that there are unlikely to be any significant negative environmental impacts resulting from this measure. The application of the criteria will facilitate the shipments of waste for the treatment as well as end of waste material across the Union and outside. For end of waste material, the rules of the Waste Shipment Regulation would not apply and therefore would facilitate the shipments outside the EU. The end-of-waste criteria, that build also on measure 2.5. and 2.8, will minimise the risk that the loads exported as sorted textiles may contain waste fractions.

In relation to the potential replacement of primary products with end-of-waste products it would be expected that this replacement would have environmental benefits by driving down the need for virgin materials in the future and the environmental impacts of the production of virgin materials. It is not possible to quantify these impacts as the precise scope of textiles that would impacted by the end-of-waste criteria is unknown.

In view of the production of textiles consumed in the EU largely taking place outside the EU and the majority of textiles collected and sorted for re-use being destined to global re-use markets, the environmental benefits are largely allocated in third countries.

Social impacts

No significant social impacts have been identified.

Administrative burden

Under the current EU regime, waste textiles even if they may be suitable for reuse or as a feedstock for recycling, are subject to a waste control mechanism for the movements between Member States. The development of end-of-waste criteria would mean that the shipment of waste for recovery that meet those criteria would be facilitated. The materials that meet the criteria for the output of the recovery operation would no longer be subject to waste legislation and controls. This would remove the administration in relation to the waste status and simplify shipments of textiles accordingly both within and outside the EU. Inspections of shipments for compliance with the waste legislation would be facilitated as compliance would be checked against a set of harmonised rules in the EU; furthermore, the criteria would also provide for the evidence (traceability and quality check requirements) to demonstrate compliance.

An additional 0.5 FTE would be required within the European Commission to adopt the necessary implementing act setting out harmonised end of waste criteria.

Impact on SMEs and social enterprises

Given SMEs, including social enterprises, are the majority of those involved in the placing on the market of textiles as well as in their waste management (sorting, transportation, recycling and re-use), the application of end-of-waste criteria is most likely to provide benefits to SMEs and social enterprises above other stakeholders.

Stakeholder evidence

Both the industry and a major NGO recognise that there is a need to define end-of-waste criteria and that this measure plays a crucial role in establishing shared systems and understanding[65] [66]. Due to their capacity to support coordination of systems across states, addressing definitions, guidance development and sharing of best practice and the adoption of EU end-of-waste criteria for textiles were regarded as key enablers, and suggestions were that they should potentially be applied together. Combined these would reduce the administrative burdens, cost and exporting challenges in relation to certain textile materials, whilst driving economies of scale. In turn, this would decrease costs for recyclers as well as brands, retailers and consumers by reducing the price for recycled materials[52]. These measures could also be further paired with EPR to accelerate their impact[67] [68].

The role of harmonisation across states was also identified as vital to avoid distortion of competition which could create more favourable circumstances for some companies[69].

The Commission – through the JRC – is already exploring end-of-waste criteria for textiles and there is need for further understanding on textile waste vs used textiles. The Commission should develop guidance on end-of-waste status (both when a product becomes a waste and when a waste becomes a product). Harmonising those rules at European level is key to facilitate preparation for reuse targets[70]. Participants particularly desired a better understanding of how to treat and process textile waste as a resource which will create the volumes needed to make recovery worthwhile and scalable.

As is the case with other measures, feedback indicated the need for end-of-waste criteria to align with the focus of other key regulatory initiatives such as the ESPR, alongside investment in recycling. It was also suggested that EoW criteria be focused on high volume materials such as pure cotton streams which could allow for key learnings to be captured which would inform application to other textile waste streams. EoW criteria should then be considered for the wider range of fibre and blends used across the industry, to ensure investment in technologies which can also recycle these[71]. In addition, the textile-related definitions currently being developed by

[65] Interview with Ellen MacArthur Foundation
[66] Interview with Policy Hub
[67] Interview with Euric
[68] Interview with Eurocommerce
[69] Interview with ARTSHC
[70] Interview with RREUSE
[71] Stakeholder workshop

the European Committee for Standardization should be fully considered in the revised directive[72].

Table 12 : Summary of impacts for measure 2.6

Stakeholder affected	Economic impacts	Environmental impacts	Social impacts
Producers, waste managers (encompassing collectors, sorters and managers)	This measure would create new market and investment opportunities for both companies and SMEs. End-of-waste criteria would increase the quantity of recycled products, thus creating new opportunities. This would boost the circular economy and reduce the export of textile waste.		
Public authorities	This measure would reduce the administrative burden for waste shipping and exports as lower amount of textile would be considered waste		
All stakeholders		This measure would reduce the amount of disposed textile, replacing virgin materials with	Minor impact

[72] Stakeholder workshop

		textiles that were waste.	

Impacts on competitiveness

The following impacts on competitiveness have been assessed under this measure.

Table 13 - impacts on competitiveness of measure 2.6

Price competitiveness impacts	No impacts on price competitiveness have been identified under this measure given that the end-of-waste criteria would apply uniformly across the EU. Those firms and Member States with already existing end-of-waste criteria may increase or decrease their competitive positions depending on the changes required to adapt to the EU wide criteria.
Dynamic competitiveness impacts	This measure has the potential to incentivise the repair and reuse market as well as the recycling markets in Member States by potentially allowing easier movements of reusable and recyclable materials that would no longer be categorised as waste in the future.
Export competitiveness impacts	No significant export competitiveness impacts have been identified for this measure.
Strategic competitiveness impacts	The potential to improve feedstock movements for the reuse and recycling markets under this measure would assist in developing textile reuse, repair and recycling at the EU level.

Measure 2.8 – Setting requirements for shipments of textiles for reuse

Assessment of impact Measure 2.

Economic impacts

Implementation of this measure would entail costs in relation to:

Member States setting up the templates for the presentation of the information required upon inspection. However, the requirements in the measure are focused on factual information. Therefore, there should not be much room for national adaptations. Furthermore, this information is already readily available to the operators. This information is to be held by the

entities transporting used textiles. Since this information is likely to be already available, no significant additional costs would be attributed to the compliance with these requirements.

Operators would need to provide a declaration that the textiles exported are not waste. This is expected to be less than an hour per declaration, with the main cost related to the reporting of materials to the relevant competent authority once per year under the existing reporting obligations. This would amount to approximately 208 euro per operator per year affected[73]. It is unknown how many enterprises would be affected by such an obligation as the total number of relevant exporters is not recorded at the EU level.

The requirements in relation to the preparation of the bales of sorted textiles for transportation reflect the best practice of the industry to ensure that the value of the products is maintained; therefore, no significant additional costs would be attributed to the compliance with these requirements for the sorters or transporters of goods.

With regard to the enforcement activities of the competent authorities, the requirements for the availability of documentation proving the product status of textiles should facilitate the existing enforcement and inspection processes carried out by the authorities in the enforcement of Waste Shipment Regulation. Therefore, a reduced administrative burden is expected for inspectors that could not be quantified precisely.

Inspections in the third countries receiving textiles are not foreseen under this measure so there is no additional administrative burden.

New business opportunities for entities (based in the EU or outside the EU) to assist the sorting operators in data collection in third countries where textiles are exported for reuse and data analysis may be expected and reduced textile waste management costs to the reuse operators within or outside the EU on account of reduced share of potential waste fractions in the bales of sorted textiles for reuse imported from the EU should be realised.

Potential impacts on flows of textile waste are presented under environmental impacts below.

No significant impact on the price of textile goods would result from this measure.

Environmental impacts

The majority of exports from the EU to third countries of used clothing and clothing accessories, blankets and travelling rugs, household linen and articles for interior furnishing and textile materials including all types of footwear and headgear are to non-OECD countries. An examination of data from Comext[74] for the period 2017-2021 shows that in 2021, 61 countries received 98.8% of volumes exported from the EU, amounting to at least 1 000 tonnes of used textiles from the EU. The controls in place for the management of these materials are likely to vary dramatically.

[73] Based on an estimated 8 hours of effort per year per organisation
[74] DS-045409

The top ten destination countries for EU exports the period 2017-2021 are shown below.

Table 14 : Destination countries for EU exports of used textiles

	Year				
	2017	**2018**	**2019**	**2020**	**2021**
Total EU exports	1,143,487	1,188,647	1,298,263	1,209,608	1,325,079
Country of destination					
Pakistan	119,989	158,959	181,650	174,302	213,549
United Arab Emirates	67,166	87,776	110,733	139,423	137,608
Tunisia	107,539	97,483	109,026	102,692	102,754
Cameroon	66,048	67,235	67,097	71,293	63,005
Türkiye	59,417	62,412	71,312	54,844	54,193
Togo	50,439	51,177	53,212	52,930	50,972
Ukraine	72,967	65,114	67,354	57,213	49,541
India	35,498	31,347	44,611	38,756	43,161
Ghana			37,196	42,785	42,104
Russian Federation (Russia)	36,311	37,014	37,986	35,874	39,472
Belarus	32,205	33,337			

Stakeholders in the context of the impact assessment accompanying the proposal for a revision of the Waste Shipments Regulation[75] raised the issue that third countries often welcome EU wastes as they are generally well sorted and have a higher economic value compared to domestic waste or waste from other countries. However, the import of EU wastes can displace domestically generated wastes in other countries with even less effective management of waste or cause them to be simply disposed or even dumped rather than being managed appropriately as shown in Table below.

An examination of waste management practices in the top destination countries of used EU textiles listed using data from the World Bank[76] notes a high level of landfilling and open burning in those countries.

Table 15 : Waste management practices in importing third countries

[75] SWD(2020) 26 final

[76] World Bank (2020) What a Waste Global Database - Country level dataset – note that gaps in the data exist with no data reported for Ghana and in some cases only some percentages reported by treatment type

Country	Waste treatment method applied					
	Percentage of waste disposed of in controlled landfill	Percentage of waste disposed of in other landfill	Percentage of waste open dumped	Percentage of waste incinerated	Percentage of waste recycled	Percentage of waste composted
Pakistan		40	50		8	2
United Arab Emirates		9	62		20	9
Tunisia		70	21		4	5
Cameroon			80.3		0.4	
Türkiye			44			1
Togo			96.2		2	1.8
Ukraine		94.07		2.73	3.2	
India			77		5	18
Ghana						
Russian Federation (Russia)			95		4.5	
Belarus	76.9		7.1		16	

Source: World Bank, 2020

In general (except Turkey) within OECD and EU countries only 35% of waste is landfilled[77] meaning that these countries have more effective waste management in place in comparison to those countries receiving used EU textiles. This would support the hypotheses therefore that EU textile wastes are likely to be contributing to the blocking more effective management of domestic wastes in those third countries. Placing a financial cost on such displacement is not possible. However, ensuring that textiles exported are fit for reuse and are not a waste would clearly have a positive impact on the management of waste in those countries and the related environmental benefit.

To determine the environmental impacts resulting from textile waste management in third countries in comparison to the EU the support study used the dedicated waste LCA-model EASETECH[78] also used by the JRC applied the datasets describing open dump and open burning activities for individual waste materials. In the absence of a specific dataset for textile the impact of textile waste has been approximated as a mix of plastic (15%) and paper/cardboard (85%) based on the assumption that ca. 15% of the textile is composed of biological fibres while the rest is synthetic (Riber et al. 2009[79]). To calculate the net environmental benefits of managing textile wastes in the EU in comparison to third countries the following results from EASETECH have been applied: a GHG saving by treatment in the EU in comparison to third countries of 1.7 tonnes CO2e per tonne of textiles disposed of and saving in terms of externalities when 285 euro per tonne has been applied[80].

[77] World Bank (2020) What a Waste Global Database - Country level dataset – note that gaps in the data exist with no data reported for Ghana and in some cases only some percentages reported by treatment type

[78] Clavreul et al. (2014) https://www.sciencedirect.com/science/article/pii/S1364815214001728

[79] Riber et al. (2009) https://www.sciencedirect.com/science/article/abs/pii/S0956053X08003322

[80] These are the same values used in SWD(2020) 26 final in relation to disposal of textiles in third countries in comparison to the EU.

It is difficult to determine the volumes of waste textiles currently included in total exports of EU clothing to third countries. Using the rejection rate of collection bins (approximately 10%) on the 475 000 tonnes of textiles sorting that is currently undertaken in third countries, would result in 47 500 tonnes of textiles being waste. Alternatively, using Comext values for all EU exports of used textiles in 2021 of 1.325 million tonnes and applying the same 10% waste content of all such shipments would mean that for 2021, 132 500 tonnes of textile wastes may be found in materials currently exported. If the values reported in relation to Staff Working Document accompanying the ecodesign proposal[81] of 40% of the materials exported being waste were used these values would climb to between 190 000 and 530 000 tonnes. Managing these wastes within the EU in comparison to third countries would result in CO2 eq savings of approximately 81 000 – 225 000 tonnes per year and externality savings of between 13.5 million and 37.7 million euro per year using the 10% waste value and 54 million euro and 150.8 million euro per year.

Social impacts

The social impacts of textiles waste are emphasised in the Commission's Staff Working Document accompanying the ecodesign proposal[82] that notes that garments exported for reuse often end up being burnt, which impacts the local environment and inhabitants as developing countries generally do not have the suitable infrastructure to discard them safely. The same SWD quotes that 40% of the clothing traded at the Kantamanto Market (Ghana) ends up in landfill almost immediately due to its poor quality. McKinsey[83] also notes that exports of used clothing and household textiles to third countries are partly legitimate and aligned with the waste hierarchy as some goes to reuse. However, McKinsey also identifies that there is simultaneously a large problem with textile-waste management especially in some of the Global South countries to which European textiles are exported—particularly the exports of unsorted textile waste as many of these countries do not have the capacity to recycle this waste and as a consequence much of it ends up in landfills or incineration. Whilst several NGOs have highlighted the challenges resulting from exports of textile from the EU to third countries (Greenpeace[84], the Plastic Soup Foundation[85], and the movie 'Textile Mountain'[86]), the challenges of fast fashion have also been acknowledged by UNEP[87] and the OECD[88] at the end of textile life. The export of

[81] See footnote **Error! Bookmark not defined.**
[82] See footnote **Error! Bookmark not defined.**
[83] See footnote 46, p. 47.
[84] Wohlgemuth V (on behalf of Greenpeace), 2022. How Fast Fashion is using the Global South as a dumping ground for textile waste https://www.greenpeace.org/international/story/53333/how-fast-fashion-is-using-global-south-as-dumping-ground-for-textile-waste/
[85] Plastic Soup Foundation, 2022. Come on EU! The massive dumping of discarded clothing in Ghana and Chile must stop https://www.plasticsoupfoundation.org/en/2022/03/the-massive-dumping-of-discarded-clothing-in-ghana-and-chile-must-stop/
[86] Fellipe Lopes, 2020. Textile Mountain: The Hidden Burden of our Fashion Waste https://www.textilemountainfilm.com/
[87] UNEP, 2018. Putting the brakes on fast fashion. https://www.unep.org/news-and-stories/story/putting-brakes-fast-fashion

these quantities also leads to additional transport further weighing down on the environmental impact of textiles.

This measure with regard to textile wastes sent to third countries would undoubtedly reduce the volumes of materials dumped and open-burned in such a manner having a positive impact on the social wellbeing on people in proximity to such waste sites as well as in relation to the health and safety of those currently involved in such waste management activities. Conversely, however, and in keeping with the social impacts of measure 2.5, the employment of those currently involved in sorting textiles in third countries would be negatively impacted from an economic standpoint as textiles would be better managed within the EU requiring less sorting to take place in third countries.

Impact on SMEs and social enterprises

Given the majority of those involved in collecting and sorting textiles are SMEs including social enterprises which currently largely take care of textile collection the obligations under this measure (proper preparation of bales for shipment transportation, documentation preparation, as well as support for related inspections by competent authorities) would fall on such enterprises. The requirements in relation to the preparation of the bales of sorted textiles for transportation reflect the best practice of the industry to ensure that the value of the products is maintained; therefore no remarkable additional costs would be attributed to the compliance with these requirements for the sorters or transporters of used textiles.

Stakeholder evidence

The NGO stakeholders as well as sorters have raised concerns about the impacts on third countries as a result of import from the EU of used textiles due to illegal shipments or legal shipments of used textiles which may nevertheless contain large fractions of non-reusable textiles placing burden on the waste management systems in those countries. These views have been raised in the stakeholder textile workshops, targeted consultation as well as in materials submitted as evidence during this assessment[89].

Table 16 : Summary of impacts for measure 2.8

Stakeholder affected	Economic impacts	Environmental impacts	Social impacts

[88] OECD, 2022. Global Plastics Outlook. https://www.oecd-ilibrary.org/environment/global-plastics-outlook_de747aef-en

[89] See for example European Environmental Bureau, 2022. Wellbeing wardrobe: A wellbeing economy for the fashion and textile sector – submitted as evidence by the EEB.

Waste managers (encompassing collectors, sorters and managers) or traders transporting textiles	No significant additional impacts identified in view of existing practices. It would also improve the level playing field among the operators as it would reduce the occurrence of illegal shipments.		
Public authorities	Positive impact as the measure would facilitate the enforcement of illegal shipments in the framework of continuous enforcement activities.		
Citizens (in particular, in third countries)			The social impacts of textile wastes exported and handled by reuse (non-waste) operators or citizens in the vicinity of the illegal waste disposal operations in third countries would be minimised by the reduction of illegal shipments of waste.
All stakeholders (in particular, in third countries)		This measure would improve environmental quality as it would help avoid illegal	

		shipments of waste disguised as used products due to export of unsorted or inappropriately sorted textiles. This measure would bolster the reuse of textiles in non-EU countries that are textile export destinations. This would have environmental but also social and economic benefits for the residents of these countries.	

Impacts on competitiveness

The following impacts on competitiveness have been assessed under this measure.

Table 17 - impacts on competitiveness of measure 2.8

Price competitiveness impacts	The largest price impacts are likely to be felt by those Member States that most heavily rely on exports of discarded textiles to third countries. This would particularly impact on BE (16% of all EU exports), DE (17% of all EU exports), ES (8% of all EU exports), FR (8% of all EU exports), IT (12% of all EU exports), NL (8% of all EU exports) and PL (14% of all EU exports). However, as the costs impacts are administrative and reflect a small cost in total the impacts are likely to be low overall.
Dynamic competitiveness impacts	No significant dynamic competitiveness impacts have been identified under this measure.
Export competitiveness impacts	No significant export competitiveness impacts have been identified under this measure.
Strategic	No significant strategic competitiveness impacts have been identified

competitiveness impacts	under this measure.

Measure 2.9 – Mandating the use of EPR

Assessment of impact Measure 2.9

Due to a lack of data on pre-consumer textiles, post-commercial textiles and post-industrials textiles the assessment of impacts below focusses on the post-consumer fractions of textile waste.

Economic impact

The intention behind an EPR is to ensure that the producers of textiles take into account the costs of end-of-life management of the textiles that they produce. According to the evidence collected the management of discarded textiles both across the EU and within EU Member States is fragmented with a mix of different actors from the public, private and social enterprise sector involved in different aspects of collection, sorting, reuse, recycling and disposal. This inevitably leads to inefficiencies in waste management and the transfer of overall responsibility from this mix of actors to EPR would look to address these inefficiencies whilst making sure that the actors already involved in such waste management as well as new actors in the future are given a role in the operation of EPR as required under Article 8a(6) of the WFD. In this respect and reflecting on the economic impacts addressed in the individual elements in Annex 10, the costs that would be moved from the variety of actors that currently and in the future would be managing waste to PROs acting on behalf of producers under EPR would equate to approximately 2.28 billion euro by 2035 or approximately 3.5% of the turnover of the clothing sector in 2022[90] and 1.5% of the turnover of the textiles sector overall. Approximately 457 million euro of the total relates to collection costs with the remaining 1.8 billion euro related to sorting and treatment costs. At the same time approximately 1.1 billion euro of reusable textiles would be available to the market as well as 188 million euro of textiles for feeding into closed loop recycling and 49 million of textiles for open loop recycling – these impacts may be expected to take place under the baseline but the funding necessary to ensure that this is the case would be far more unsure across the EU than under an obligatory EPR scheme.

It is also important to note that much of these costs are not additional but are instead otherwise covered through general waste management funding at the Member State level including through general taxation. Therefore, this entails a transfer of costs from public authorities and waste management actors to the producers. In effect 58% of the costs would be recovered through the

[90] Euratex, 2022. Facts & key figures 2022 – places industry turnover at €147 billion in 2021 with clothing accounting for turnover of €65 billion of this total.

onward reuse and recycling of the textile wastes collected, sorted and subsequently resold or recycled.

The impacts on the price of textile goods would equate to an average cost increase of 0.6%. For an average T-shirt this would be a maximum of 12c per T-shirt with the actual cost likely to be lower. For more complex textiles items containing disruptors such as zips and buttons the cost per item in cents would be higher but as a proportion of the total cost of the product is likely to remain the same

It is important to note that the introduction of EPR has the potential to change the nature of the organisations involved in the collection, sorting and subsequent reuse, recycling and disposal of textiles. As noted in Annexes 5 and 6 in all countries where data is available the major share of used textile collection is currently carried out by charitable and commercial collectors. In Denmark, Finland, Latvia and Sweden, the collection is dominated by charitable organisations. In Lithuania, commercial collectors are responsible for 54 % of collection.[91] In France, Germany and the Netherlands, commercial collectors also have a reportedly high share of the market, though there are no concrete figures on how big this share is.[92] Municipal waste companies play an increasing role in used textile collection in many countries. In Estonia, due to legal obligations, municipalities carry out 37 % of all collection, and in Lithuania they have a 30 % share.[93] Collection by municipal waste companies in Denmark, Netherlands and Sweden are thought to be lower. In Denmark for example municipalities had a share of 5 % in all collection in 2017, but this is increasing over time.[94] Implementation of EPR has the potential to change this approach as Member States may increasingly look to municipalities and commercial operators to ensure the collection of textiles wastes and their subsequent sorting and treatment.

The measure foresees the need for Member States to ensure that social enterprises are involved in the operation of EPR schemes as well as in an active dialogue in implementation in accordance with Article 8 of the WFD in order to mitigate the potential negative impacts of EPR on their operations. However, it is expected that the costs of collection and sorting would increasingly fall upon commercial operators and municipalities, particularly given the likely fall in the quality of textiles for reuse that would result from increased collection in the future. The funding generated by EPR is likely, therefore, to focus on the additional collection and sorting that will take place in the future with municipalities and commercial waste collectors and sorters receiving the majority of funds generated through EPR to address these costs. This will be particularly important for the recycling sector that requires funding to support research and

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[91] Watson, D., Kant Hvass, K., Moora, H., Martin, K.; Nausėdė, V., Gurauskiene, I., & Akule, D., *Textile circularity in the Baltic countries: current status and recommendations for the future,* Nordic Council of Ministers TemaNord Report, 2020b.

[92] Watson, D., Trzepacz, S., Kiørboe, N., Elander, M., Ljungkvist Nordin, H., Lander Svendsen, N., & Wittus Skottfelt, S, *Towards 2025: Separate Collection and Treatment of Used Textiles in 6 EU countries*, 2020a.

[93] Watson, D., Kant Hvass, K., Moora, H., Martin, K.; Nausėdė, V., Gurauskiene, I., & Akule, D, 2020b.

[94] Watson, D., Aare, A. K., Trzepacz, S. and Dahl Petersen, C., *Used Textile Collection in European Cities,* Study commissioned by Rijkswaterstaat under the European Clothing Action Plan (ECAP), 2018a.

development and is not the primary focus of textile collections operated by social enterprises that focus on reuse. This is ably demonstrated by the estimated costs of the likes of the ReHubs initiative that has identified costs of implementation of 6-7 billion euro up to 2030 but for which funding is sought[95]. Additionally, the geographical scope of Rehubs envisages five Member States acting as recycling centres - Belgium, Finland, Germany, Italy and Spain. These Member States would also serve other EU Member States. However, this leaves a gap geographically in central Europe, particularly for the likes of Romania, Bulgaria, Greece, Hungary and Slovakia that are some distance from the nearest Rehub, each requiring textile wastes to transit over at least one other country to reach the necessary recycling centre. The need to ensure sufficient and cost-effective recycling is provided for these Member States would also likely require PRO funding.

The development of a producer register would require a new register to be developed. Setting up a register will generate additional costs both in terms of establishment and in terms of maintenance of the system. In ascertaining the costs of such a system an examination of the costs identified in the application of registration under the WEEE Directive has been performed. In the impact assessment accompanying the proposal to recast the WEEE Directive in 2008, the costs of drawing up registers of producers across the EU was determined as 14M euro in total. Adjusted for inflation the present-day cost would be 18.7M euro for the EU in total. However, these registers for WEEE address almost 90 000 producers in the EU overall. Depending on the inclusion of exclusion of micro-enterprises (see Table 59 below) the number of producers likely to be impacted in the EU for textiles would more likely sit between 16 500 and 68 000 producers. The costs for textiles would, therefore, be lower and more likely sit between 2 and 12.3 million euro. It is likely that the upper bound is still overestimated since it should be feasible to reduce the costs by integrating the register into other existing systems for producer registers under other EPR schemes; it is a practice in several Member States to operate producer registers that serve simultaneously several EPR systems.

With the two systems already in operation in France and the Netherlands, the average cost per Member State would, therefore, be between 80 000 and 492 000 million euro per Member State dependent on the inclusion or exclusion of micro-enterprises. Maintenance costs, in keeping with the estimated maintenance costs of registers at the EU level as presented in the Commission Impact Assessment accompanying the proposal to revise the Waste Shipments Regulation are estimated at between 11 200 and 69 000 euro per Member State per year.

Additional costs would apply in relation to producers registering with the system. The main costs would be in completing producer details to enable the generation of the relevant Producer number. Such costs would expect to equate to 0.5 day per producer to complete the relevant details with a total cost of 104 euro per registration. Whilst the total number of Producers that would be impacted is unknown for those not manufacturing products within the EU, for manufacturers of textiles within the EU this would be a one-off cost and is assessed below.

[95] https://www.innovationintextiles.com/rehubs-seeks-67-billion-for-bold-plan/

Table 18 : Indicative one-off costs for registering in a national producer register

Size of company	Number of producers	Cost of annual PoM data
From 0 to 9 persons employed	115,943	12,058,072
From 10 to 19 persons employed	6,767	703,768
From 20 to 49 persons employed	4,137	430,248
From 50 to 249 persons employed	1,920	199,680
250 persons employed or more	240	24,960
Total	129,007	13,416,728

As can be seen, should micro-enterprises be included in the scope of EPR, the majority of costs would fall upon this fraction of EU textile manufacturers. Should micro-enterprises be excluded the total administrative burden would decrease from 13.35 million to 1.35 million euro for the EU overall.

The calculations of the one-off registration costs reflect on a situation whereby each producer registers in one producer register. However, there are likely to be situations whereby producers place goods on the market of more than one Member State. The one-off costs identified above would, therefore, multiply in the case where producers place goods on the market of more than one Member States. If, for example, producers placed goods on the market of five different Member States which even for smaller producers is possible with the rise of online sales, the total costs would be approximately five times higher as whilst the basic requirements should be the same across the EU the variations in actual systems of registration and language requirement will likely result in little saving in terms of time taken to register in additional countries once registration has taken place in another. The measure therefore provides that the information requirements that producers need to submit to the register are harmonised and specified in the WFD so that it is clear from the outset of the WFD revision across the EU and reduce compliance costs for producers operating across several countries.

In the case of producers selling goods in Member States where they have no legal registration they will need to register with an authorised representative in the country of sale. An authorized representative is a natural or legal person who assumes EPR obligations in a country on behalf of such a producer. Authorised representatives will charge fees to represent producers in third countries. By way of example, a service provider[96] offering authorised representative services to

[96] https://www.productip.com/#home

both producers located within the EU and producers based in third countries charges an annual fee of approximately 1 800 euro per year plus an hourly rate of 225 euro per hour for additional support. In the case of medical devices that also require an authorised representative a figure of approximately 2 000 euro per year is quoted[97]. In both of these examples the services include the costs in relation to product standards that are likely to be higher in terms of resources required to be expended by an Authorised Representative in relation to EPR. With this in mind, the lower cost quoted of approximately 1 800 euro per year for the appointment of an authorised in any given Member State is considered representative in this case. These fees would apply per country of sale and, thereby, should a producer sell in several countries using an authorised representative in each the costs would be multiplied by the additional number of countries concerned. There is also the possibility for PROs to operate as an Authorised Representative for producers in other Member States placing goods on the market for the Member State within which they are the PRO. In this case the costs of registration with a PRO in the previous paragraph would apply.

Additionally, producers will be required to provide information on the volume of products placed on the market and in relation to the eco-modulation of fees to determine the fees payable on the basis of the eco-modulation criteria applicable to their products. The production of data addressing the overall volume of goods placed on the market would be similar to the costs of initial registration i.e., 0.5 day per producer. The costs highlighted above for one-off registration would, therefore, be duplicated for this reporting measure i.e., the total costs would be approximately 13.4 million euro per year should micro-enterprises be included and 1.35 million euro per year were they not. The production of data in relation to the eco-modulation of fees, however, will require more time and effort. In the case of the French EPR, the sustainability, integration of recycled materials from household waste and integration of recycled materials from production scrap alongside the base EPR fees effectively results in almost 50 categories to be considered in reporting of eco-modulation fees applicable. The costs are, therefore, dependent on the record keeping of producers against these criteria in any production year to simplify overall reporting alongside any efficiencies that may be achievable by providing standardised reporting tools to producers to assist them in their reporting and calculations. The time taken to report against a similar set of criteria applicable in France is estimated as 2 working days per enterprise or 416 euro per producer. The costs applicable in relation to both of these annual obligations is addressed below. Cost mitigation aspects of this measure entail: mandating the reporting under the PRO to take place annually and envisaging a mandate to the Commission to develop harmonised rules for the fee modulation purposes, including on the product category granularity for fee application.

Table 19 : Indicative annual costs of reporting total quantities of goods placed on the market as well as data on eco-modulation for EU manufacturers of textiles

[97] https://cmsmedtech.com/how-to-choose-an-ec-rep/

Size of company	Number of producers	Cost of annual PoM data	Cost of eco-modulation reporting
From 0 to 9 persons employed	115,943	12,058,072	48,232,288
From 10 to 19 persons employed	6,767	703,768	2,815,072
From 20 to 49 persons employed	4,137	430,248	1,720,992
From 50 to 249 persons employed	1,920	199,680	798,720
250 persons employed or more	240	24,960	99,840
Total	129,007	13,416,728	53,666,912

In keeping with existing EPR obligations under the acquis addressing electric and electronic equipment, batteries and packaging, Member States would be able to decide whether the register of producers is publicly accessible or not. In order for the online platforms to fulfil their obligations under this measure as a verifier of traders using their services, it would be necessary for online platforms to have access to national registers. This should not entail significant costs to the producer registers; also noting that similar obligations are also relevant for other EPR schemes and their producer registers.

With regard to the manufacturing of wearing apparel sector, the complete exclusion of micro-enterprises would effectively require the remaining 10.1% of enterprises to address the costs stemming from the exempted entities that represent 89.9%. However, by weight of goods, this represents an additional cost to SMEs and larger operators of approximately 16% of their EPR costs and this is likely to be a small additional cost. This approach would also minimise the administrative cost of applying EPR to 116 000 enterprises across the EU, and the enforcement costs for the competent authorities in ensuring that all such micro-enterprises are compliant with the EPR scheme.

A potential impact of the exclusion of micro-enterprises from EPR obligations is the possibility of the costs for products resulting from micro-enterprises falling upon other SMEs (i.e., those enterprises that have between 10 and 250 employees). As noted in the Eurostat statistics for manufacturers of textiles within the EU[98] the percentage of total turnover by enterprise size as well as the average turnover by enterprise is shown in the table below.

[98] Annual enterprise statistics by size class for special aggregates of activities (NACE Rev. 2) [SBS_SC_SCA_R2__custom_3996079]

Table 20 : Total percentage of EU turnover and average turnover per enterprise resulting from the manufacture of wearing apparel in the EU

Enterprise size	Percentage of total turnover by enterprise size	Average turnover per enterprise	Administrative costs of EPR	Administrative costs of EPR as a % of average turnover
0 to 9 persons employed	16%	87,709	527	0.60085%
10 to 19 persons employed	9%	874,834	527	0.06024%
20 to 49 persons employed	13%	2,040,126	527	0.02583%
50 to 249 persons employed	25%	8,320,000	527	0.00633%
250 persons employed or more	37%	100,878,750	527	0.00052%

Comparing the administrative costs of EPR per enterprise, it is clear that in the case of micro-enterprises the impact as a percentage of turnover is far higher than for other sizes of enterprise – almost 0.6% of turnover compared to around 0.06% for the next largest category of 10-19 persons, 0.02% for 20-49 persons category, and a negligible impact for the larger sizes of enterprises.

The cost of exempting micro-enterprises can be shifted to the fees applicable to products put on the market by enterprises of other sizes. This would result in the following changes.

Table 21 : Cost shifting to the exemption of micro-enterprises to larger enterprises

Enterprise size	Total contribution to fees with micro-enterprises included	Total contribution to fees with micro-enterprises excluded

From 0 to 9 persons employed	16%	0%
From 10 to 19 persons employed	9%	11%
From 20 to 49 persons employed	13%	15%
From 50 to 249 persons employed	25%	30%
250 persons employed or more	37%	44%

The largest additional costs would fall on enterprises with 250 persons or more employed, followed by enterprises with 50-249 persons employed. Enterprises from 10-49 persons employed would see the smallest increase in costs.

Alternatively, the application of a single low flat fee for micro-enterprises would mean that at least a partial contribution to the relevant EPR scheme is made by enterprises that contribute to the textile waste generation. For example, in France, a flat fee of 75 euro per year is applied to producers with less than 750 000 euro turnover per year or if they sell less than 5 000 products in France. Should the same fee be applied to micro-enterprises, the revenue raised would be around 8.695 million euro per year. This option would also raise the costs of EPR scheme administration as well as enforcement for the competent authorities. This cost is estimated at around 525 euro per year. Therefore, the contribution of a flat fee for micro-enterprises seems disproportionate as it adds a significant amount of effort on micro-enterprises while raising less than 9 million per year.

Based on these considerations, it is proposed that micro-enterprises manufacturing textiles should not be subject to the EPR requirements in view of the effectiveness and proportionality principle.

The nature of the textiles industry is such that it is heavily dominated by micro-enterprises for which it is considered that the costs of application of the EPR obligations would be high as a fraction of their turnover whilst the additional administration for PROs and Member States in dealing with the large number of micro-enterprises would also be high. For this reason, the measure has been targeted to exclude micro-enterprises to mitigate this economic impact. Similarly social enterprises involved in the resale of textiles would be excluded given the possible impacts on their operational models and the citizens that benefit from their operation.

Addressing the full costs of waste management would apply the polluter pays principle and with greater investment in the management of textile waste would assist in driving forward to reuse repair and recycling sectors for textile by ensuring that adequate funding is in place.

The actual costs per textile item are expected to be low. By way of example Eco-Logic[99] notes that Eco-TLC the French PRO for textiles calculates the EPR fees based on the number of items placed on the market. The categories of fees are divided into 4 levels of scale depending on the size of the items: very small, small, medium and large items (Eco TLC 2019). Eco-modulation is applied on top of the standard fee, which in turn is based on the durability of textiles as well as the recycled content of textiles. Ecologic notes that the French EPR fees along with eco-modulation make a very small part of the price of the product in France.

Table 22 - EPR and modulated fees for textiles in France

Size of item	Very small	Small	Medium	Large
Standard fee scale (EUR excl. VAT/items)	0.002	0.009	0.020	0.063
EM1 Durability	0.001	0.0045	0.010	0.0315
EM2 Recycled content	0.001	0.0045	0.010	0.0315
EM3 Recycled content	0.0015	0.00675	0.015	0.04725

A significant economic advantage that cannot be quantified relates to the standardisation of EPR schemes for textiles across the EU under this measure. As noted in Annexes 6 and 11 FR is currently the only Member State with an EPR for textiles in place. The NL, which was due to implement EPR for textiles on 1 January 2023 (and has been delayed until summer 2023 according to the latest information available) will be the second Member State to implement EPR for textiles and SE is likely to be the third. However, the scope and operation of the EPR schemes varies and the potential for other competing yet different EPR schemes for textiles across the EU risk the development of rapidly diverging schemes that would significantly hamper producers from accessing Member State markets other than their main Member State of business given the likely levels of confusion that would result from this divergence. A good example of this possible divergence is provided in the table below that considers the scope of the EPR schemes for FR, NL and SE.

[99] Eco-logic, 2021. Extended Producer Responsibility and Ecomodulation of Fees

Criteria	Member State		
	FR	**NL**	**SE**
Scope	New clothing textile products, shoes or household linen intended for private individuals and, from 1 January 2020, new textile products for the home, excluding those which are furnishing elements or intended to protect or decorate items of furniture. Note that CN codes are not specifically addressed in the Ministerial Decree;	Using the relevant CN codes: Household textiles : table, bed and household linen as referred to in Chapter 63, Part I, heading 6302 Clothing : consumer and industrial clothing as referred to in Chapters 61 and 62; Specifically excluded goods are: Shoes, bags, belts (no textile products); Unsold inventories at producers (not placed on the market); Returns to producers upon cancellation of purchase (not placed on the market); Blankets (6301); Net curtains , curtains and roller blinds (6303); Bedspreads (6304); Pockets (6305); Tarpaulins , sails , tents (6306); Mop , Dishcloths , Cleaning Cloths , Dusters (6307)	Using the relevant CN codes: 4202 1291 Bags with textile exterior 4202 1299 Bags with textile exterior 4202 2290 Bags with a textile exterior 4202 3290 Articles normally carried in the pocket or purse 4202 9291 Bags with textile exterior 4202 9298 Bags with textile exterior 57 Carpets and other textile floor coverings 61 Clothes and accessories for clothes knitted or crocheted 62 Clothing and accessories for clothing not knitted or crocheted 6302 Bed linen, table linen, toilet towels, kitchen towels and similar articles 6303 Curtains, blinds and draperies; curtain valances and bed valances 6304 Other furnishing articles
Reporting frequency	Annual	Annual	Annual
Reporting date	By March 31 on previous years data	By 1 August on previous years data	By March 31 on previous years data
SMEs addressed	Yes, albeit a flat fee of 75 euro per year is applied to producers with less than 750 000 euro turnover per year or if they sell less than 5 000 products in France	A further explanation is also requested of the possibility of exempting small producers from the reporting obligation in the ministerial regulation. The latter is indeed possible: an exemption can be included for producers who produce up to a certain size. In the case of plastic packaging, for example, it has been decided in the ministerial regulation on packaging reporting that producers who use less than 50,000 kilograms of packaging annually are exempt from the reporting obligation under the Decree. No decision has yet been taken on whether an exemption will be applied to textile producers and where the limit would be. This is laid down by ministerial regulation. A basis for this is included in Article 7(3) of this Decree. No decision on this has yet been taken	The investigation has assumed that all manufacturers, sellers and renters of textiles are producers. This would include SMEs.
Obligation to use a PRO	Producers can either set up an individual scheme for the recycling and treatment of this waste or can contribute financially to an organisation created for this purpose and to which they belong (a producer responsibility organisation - PRO).	Producers can jointly implement the obligations arising from the EPR textiles (Article 6 of the EPR Decree). The obligations resting on the individual producers will then be transferred to the producer organization, which will notify the Minister of Infrastructure and Water Management on behalf of these producers. It is estimated that the implementation of the Decree will cost 16.8 FTE at the level of individual producers, compared to an expected 5.8 FTE if a producer organization is present.	Producers can use a PRO but it is not obligatory.
Eco-modulaton	Eco-modulation is applied based on durability and recycled content of products	This is regulated in Article 6, third paragraph, of the UPV Decree. The fourth paragraph of this article obliges the producer organization to differentiate the contribution of producers if possible, in particular by taking into account the entire life cycle of products and the durability, reusability, recyclability and the presence of hazardous substances. In view of Article 6(4) of the EPR Decree, however, tariff differentiation falls under the responsibility of the producer organisation(s).	In order to obtain permission to operate a collection system, the applicant must thus demonstrate that the fee for an individual producer, whenever possible, adapted based on the properties of the textile that the collection system has undertaken to take care of when it becomes waste. When the fee is calculated, a life cycle perspective must be applied and special consideration must be given to properties that affect the textile's active lifespan and material recyclability. If the Commission publishes guidelines and adopts harmonized criteria, the operator of the collection system and the Swedish Environmental Protection Agency can use these as a starting point when applying this requirement.

It is apparent that different choices in relation to the scope of the EPR schemes have or are likely to be made, meaning in turn that producers of different types of textile goods are likely to encounter different requirements in different Member States. The reporting dates also vary, and the application of the requirements to SMEs may also diverge depending on the decisions still to be taken in SE and NL. Finally, the eco-modulation of fees is likely to vary given the different criteria listed in FR, NL and SE. In each of these cases variation of the requirements is likely to result in a lack of level playing field across the EU for producers and a lack of consistency in application of requirements when selling goods in more than one Member State.

In relation to the adoption of Implementing Acts in relation to the content of the Producer Registers as well as the eco-modulation of fees approximately 1.2 FTEs would be required in the European Commission. Member States would also be asked to make input to the necessary implementing act with the total cost of inputs of Member States of approximately 135 000 euro per implementing act with about 50 individuals making input.

Textiles have been confirmed as a priority product under ESPR following the stakeholder consultation[100], and the technical work supporting the Delegated Act on textiles under the ESPR is underway. It is estimated that the Delegated Act would be adopted in 2024/25 which coincides broadly with the possible adoption and entry into force of the Waste Framework Directive rules on Extended Producer Responsibility considered in this assessment. Therefore, full alignment is possible both at the policy development and implementation stage. Full alignment between the two legislations in terms of scope and standards (e.g. on the design factors and measurement tools) is a top priority for the Commission. In practice, it is important to ensure that fee modulation under EPR is fully consistent with the ESPR sustainability criteria and their measurement standards. This will provide the clearest policy signal and prevent unnecessary administrative burdens. This approach is also strongly supported by the textiles industry.

Environmental impacts

The application of EPR should both ensure that adequate infrastructure for management of textile waste is funded as well as addressing communication to waste holders enabling to better understand the need for and opportunities for separate collection of textiles in the Member State concerned as well as on the overall impacts of textiles on the environment and the contribution of consumers, including in the purchase of used textiles. The environmental impacts may be expected to take place under the baseline, the main advantage of EPR being that the necessary funding to pay for the textiles management necessary to achieve these impacts would both be more likely and more consistent across the EU. Consequently, the indirect environmental impacts of textiles that would otherwise be discarded in residual waste should therefore be more likely to be reduced under this measure including in relation to GHG emissions through both greater reuse of textiles as well as recycling of textiles in comparison to their disposal as well as

[100] Have your say, Published initiatives, New product priorities for Ecodesign for Sustainable Products, New product priorities for Ecodesign for Sustainable Products (europa.eu).

emissions to air, water and land through the avoidance of disposal in the future. As a proportion of total textile waste generation in the EU disposal would drop from 74% at present to 56% by 2035 with a drop of nearly 670 000 tonnes in total. Notably in relation to recycling, the plans of the European Apparel and Textile Confederation (EURATEX) to significantly boost recycling of textiles is dependent on certainty in relation to the volumes and nature of the feedstock produced. EPR would target both aspects feeding into a textiles recycling market that the industry calls for to ensure investment certainty.

As noted under measure 2.5 in relation to the displacement of new textile products and virgin fibres through increased reuse and recycling, the environmental benefits in all cases outweigh the costs of production of new products and virgin fibres. Using values provided by EuRIC[101] the following savings would be anticipated to be supported through the introduction of EPR in terms of water use.

Quality level	**Reused water saving compared to new equivalent per tonne of textiles collected**	**Recycling closed-loop water saving compared to new equivalent per tonne of textiles collected**	**Recycling open-loop water saving compared to new equivalent per tonne of textiles collected**
Crème	198 000 m^3	4 500 m^3	16 800 m^3
B-grade	138 000 m^3	1 290 m^3	No value used
C-grade	5 800 m^3	1 290 m^3	No value used

Furthermore, in the case of recycling approximately ~2 hectare per tonne of fibre output as an average all fibres is applied to calculate the land-use saved through displacement of virgin fibres by recycled fibres. It is expected, therefore, that the support of EPR to recycling activities would support actions that would result in significant saving in terms of land use of up to 1.6 million tonnes by 2035.

Social impacts

The application of EPR would assist in both driving employment by improving investment in textile waste management as well as mitigating the impacts of poor textile waste management for both citizens of the EU as well as in those third countries receiving used textiles from the EU in comparison to the disparate and inconsistent approach that might otherwise develop in the absence of EPR. It has not been possible to quantify these impacts. Sorting and recycling at scale will create jobs and ensure competitiveness in light of increasing raw material and energy costs and ensure that recyclers have the necessary dependable feedstock to significantly increase closed loop recycling within the EU. By driving forward the necessary changes in textile

[101] EuRIC, 2023. LCA-based assessment of the management of European used textiles

management it is estimated that an additional 5 500 jobs would be created by 2035, supported directly by the introduction of EPR.

With regard to the impact of the EPR obligations on the cost of product, it is not possible to assess with certainty whether the producers will internalise the cost or pass it onto the consumers. Considering that the textile market is fiercely competitive, it may be possible that the producers will internalise the costs. On the other hand, the costs per item are low as shown in the table above so the overall effects are expected to be limited even if the fees applied are passed on to consumers.

Impact on SMEs and social enterprises

Given the majority of those involved as producers are SMEs, the report assessed the implications of excluding certain categories of SMEs (micro enterprises) from the EPR obligations as producers. The same was done in relation to the reuse sector that has a significant proportion of social enterprises involved in the resale of reused textiles. The impacts of their inclusion or exclusion were assessed and conclude with their exclusion. In addition, the implementing acts envisaged harmonising the formats for the producer register registration and fee modulation, including the application of the harmonised criteria on sustainable textiles developed under the ESPR, as well as the obligations for the PRO membership and reduction of reporting to the PRO to annual exercise are all specific measures aimed at minimising the compliance costs for SMEs. Several features of the proposed EPR scheme aim to ensure that the role of the social enterprises in the management of textile waste for re-use purposes is maintained or strengthens with the establishment of the EPR schemes, namely, through setting an obligation for the EPR schemes to allow their participation in the collection networks and to finance the treatment of recyclable and residual waste generated by the textile sorting operations operated by social enterprises. These measures should avoid disrupting the business model of social enterprises and in fact facilitate it.

An additional 1.2 FTE would be required within the European Commission to adopt the necessary implementing acts setting out harmonised fee modulation and producer register registration format.

Stakeholder evidence

Stakeholders from across the textile value chain including NGOs and social enterprises active in the sector recognise the importance and relevance of introducing EPR to facilitate a harmonised approach to managing textile waste in the EU and consider its introduction as a high priority. In respect to support to the recycling sector, in particular, the industry considers EPR as an important funding mechanism to address the R&D and funding gap for such activities. NGOs have also emphasised the importance of EPR for textiles to implement the polluter pays principle.[102] Diverging EPR systems were raised as a concern within the workshops, mainly due

[102] See for example: https://eeb.org/library/driving-a-circular-economy-for-textiles-through-epr/

to the potential for complex administration and potential high costs for exporting organisations[103].

Due to the complexity and ambition of the measure, it was highlighted that the scheme would benefit from the parallel application of other models such as the Ecodesign for Sustainable Products Regulation (ESPR) to enhance the effect of the targets set[104]. Industries should also be further encouraged to reuse and repair their products as part of circular economy and materials that are no longer reused should be separately collected. This can potentially increase the currently low textile-to-textile recycling rate as well[104].

There is an overwhelming support for mandating EPR for textiles among the industry and NGO stakeholders. There are however some differing opinions in terms of the level of harmonisation that the scheme should pursue acknowledging that both the industry and Member States may require some regulatory flexibility to take inventive measures[105] [106]. Others have argued the opposite that providing guidelines or encouraging an implementation of the scheme on a voluntary basis would not be expected to work as effectively as a mandated EPR.[107] Additionally, the latter group suggested that the mandated EPR should be accompanied by a set of harmonised rules for the separate collection and sorting of textiles as well as for the used textiles and textile waste market[102]. The EPR organisations should be managed by representatives of the key stakeholders such as producers waste collectors sorters and recyclers as well as NGOs[102]. It is additionally recommended that license fees should not apply to second-hand clothing as it is expected to hamper reuse activities[102].

A stakeholder group supported the mandated EPR measure as it was stated that it will ensure compliance with the requirements set across MS, increase the effectiveness of the eco-modulation fee and enhance the research and development of new preparation for recycling and recycling technologies in Europe. Industry stakeholders outlined that different EPR systems across the EU would struggle to drive economies of scale needed for developing recycling capacities to support increased uptake in textiles[108].

Regarding the expected economic impacts of an EPR mandate stakeholders underlined the substantial recurring fees[105] which one interviewee considered to be a potential obstacle for Eastern European Member States some of which may be unable to meet the set objectives on affordability reasons[109]. Additional costs may occur from data collection and validation as well as from adaptation to new labels[110].

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[103] Evidence from industry stakeholder in second workshop
[104] Interview with the Ellen MacArthur Foundation
[105] Interview with Euric
[106] Interview with Eurocommerce
[107] Interview with the Ellen MacArthur Foundation
[108] Interview with Policy Hub
[109] Interview with ARTSHC
[110] Interview with the Policy Hub

Furthermore, it was highlighted that measure 2.9 in combination with ESPR and other high-priority measures can enable price reductions for recycled textiles and other secondary raw materials which would create a competitive market for them. By extension and due to ESPR performance targets such materials will be rendered more accessible to recyclers brands retailers and consumers as with cost savings both the demand and supply of recycled fibres will increase. Specifically, on an EPR mandate across the EU a stakeholder group stated that the framework would reduce the operational costs of producers associated with different reporting systems on products placed on the market and the fee structure[110]. Because of that the EPR should focus on establishing a harmonised reporting format and on strengthening EU-wide collaboration between PROs to secure the alignment of such systems throughout Member States.[110]

The design of the EPR measure should also consider how to avoid competition between the reuse and preparing for reuse sectors. Lastly a key impact area of the mandated EPR measure is the climate. Stakeholders realise the significance of the role of EPR to keep in line with climate objectives however they note that more circular business models (such as repair reuse remanufacturing and rental) should accompany the scheme to improve its effectiveness and efficiency[104]. The EPR mandate in combination with circular business models will additionally support sorting and recycling initiatives and further minimise waste generation and unsuitable waste management practices[110] [106].

Table 23 : Summary of impacts for measure 2.9

Stakeholder affected	Economic impacts	Environmental impacts	Social impacts
Producers, waste managers (encompassing collectors, sorters and managers)	Additional costs of 2.28 billion euro per year for effective textile waste management. This measure would increase the costs of placing textile products on the market. It would add costs on data recording and reporting on products placed on the market and in relation to waste management (as per		5500 jobs in textile waste management

	measure 2.14). Such costs might result in barriers to entry for SMEs although micro-enterprises are excluded with minimal knock-on consequences for larger enterprises. This measure would provide savings in compliance costs by anticipating a harmonised EPR system for the EU and prevent the obligations on the industry to comply with potentially 27 different systems. This also provides a level playing field for the operators operating across the different countries. Level playing field is also ensured between brick and mortar and online sales producers by regulating the enforcement tools and therefore tackling free riding. This measure would result in additional support to the reuse and repair sector and the recovery of value		

	of reused textiles for 1.1 billion euro per year and of recycled textiles of 237 million euro per year. This measure would result in additional support to the textile recycling sector, increasing in particular closed-loop recycling and recovering value from non-reusable textiles, by providing feedstock for the creation of new circular businesses.		
Public authorities	Reduction in costs of waste management - this measure would transfer the costs of waste management from the municipalities to the producers to the extent that the costs incurred are necessary costs. This measure would add administrative costs related to the establishment of the EPR schemes (i.e. the establishment of a producer register, authorisation systems for the		

	permitting of PROs, stakeholder platform) and for monitoring compliance and enforcement of the compliance of PROs and producers with their EPR obligations.		
Citizens	No certainty to what extent the cost of EPR compliance would or would not impact the cost of the textile goods for consumers. Reduced costs of residual waste management where pay-as-you-throw systems are applied for that stream. Increased availability of sustainable low-cost textiles options from re-use shops and other circular businesses.		Increased awareness of the impact of sustainable textile management and the role of citizens in contributing to this objective through behavioural changes.
Producers, waste managers (encompassing collectors, sorters and managers) and public authorities			This measure would negate the impacts of textile waste on both EU citizens and third country citizens by providing sufficient resourcing to manage textile wastes more

			effectively.
All stakeholders		This measure would ensure the funding for the collection, sorting, reuse, recycling and other treatment of textile wastes compared to the baseline. This is particularly beneficial for those Member States that currently have low levels of textile collection, and which have textile production industries that may benefit from new flows of secondary raw materials. This measure would support greater reuse and recycling. In the case of recycling the support to closed-loop recycling expected to come from EPR will directly replace primary raw textile manufacture and the resource use including land use that is presently dedicated to such primary fibre production.	

Impacts on competitiveness

The following impacts on competitiveness have been assessed under this measure.

Table 24 - impacts on competitiveness of measure 2.9

Price competitiveness impacts	Impacts of price competitiveness are linked to the shift of the costs of managing textiles at the point of discard in comparison to the status quo. As noted under the assessment of economic impacts above, this has the potential for the costs of textile products within the EU to increase by up to 0.6% if the full costs are applied to the price paid by the consumer and not absorbed by the producer (whereby should some or all of the costs be absorbed by the producer the impact on price would be lower). At the same time, the nature of textile goods produced within the EU that focusses on high-quality goods supplied to mainly well-developed economies means that this price increase is unlikely to prove detrimental to volumes of exports of EU textile products. As the measure would apply universally across the EU the costs should generally be the same per tonne of product managed. However, the price impacts are likely to be most keenly felt in those Member States that currently lag behind others in their current and predicted rates of separate collection as other Member States have or will already have invested significant capital amounts in textile waste management infrastructure, thereby diminishing the costs that the EPR scheme would have to address. These shortcomings would mainly impact BG, CY, CZ, EE, EL, ES, HR, HU, LV, PL, PT, RO, SI and SK where collection rates are low at present and will remain behind the majority of Member States according to the baseline. The need to place higher fees under EPR for these countries has the potential to provide a price differential in comparison to others. In reality this would be less than 0.6% from the lowest to the highest difference as a result of the need to factor in operational expenditure in those Member States for which capital investment has taken place. In this respect a differential of up to 0.4% is a likely potential outcome.
Dynamic competitiveness impacts	This measure has the potential to improve research and development for reuse and recycling in a coordinated manner by providing direct funding by PROs to such activities. This is important given the economic challenges facing both repair and recycling markets in the EU at present in comparison to the prices of new and virgin products.
Export competitiveness	As noted above, limited, if any, impacts of exports of EU textile products are expected under this measure. Increase waste collection, sorting and treatment under this measure are likely to reduce the

impacts	volumes of used textiles exported from the EU to third countries, particularly as more material are collected for recycling within the EU. This would potentially reduce the incomes of used textile exporters within the EU as whole due to the reduced volumes available to market whilst increasing the volumes available for EU textile recyclers.
Strategic competitiveness impacts	This measure offers the opportunity to reduce the need for imports of textiles in the future as greater reuse and repair within the EU replaces the need for new textile goods to be purchased and improvements in recycling reduce the need for imports of virgin textile materials – in particular natural fibres for which the EU relies heavily on third country imports.

Measure 2.14 – Setting reporting obligations for textiles

Assessment of impact Measure 2.14

Economic impacts

The adjustments to existing reporting mechanisms would ensure that the entire management process of textiles within the EU is better understood at present and in the future to improve the ability to identify infrastructure investment needs more easily. Whilst data on the post-consumer fraction of textiles would be subject to an improvement by eliminating reporting on textile wastes that are not related to the waste fraction of concern under this initiative – removing textile packaging reporting from the scope of textiles - the most significant change would be achieved for the data on pre-consumer, post-commercial and post-industrial wastes for which little information is available at the level of granularity necessary to monitor waste management practices at national and EU levels, their compliance with the waste hierarchy and waste management planning. For these waste generation sources, the data would be most valuable to identify the recycling potential since the waste generated is expected to be of more homogeneous and known composition and consistency and purity in quality.

More cohesive data flow management would also reduce the burdens on the economic operators that operate across several Member States and improve the level playing field among them.

Given the limited cost of additional reporting foreseen (see the administrative burden assessment presented below) represents approximately 1 thousandth of one percent of the turnover for the clothing and apparel sector no noticeable additional cost increases in textile goods are likely to take place to address the additional costs of reporting.

Environmental impacts

No direct environmental impacts are expected as a result of the additional data collected. However, it is expected that an improved knowledge base on the sectors generating textile waste

will lead to better targeted measures to improve their treatment in line with the waste hierarchy and the inherent environmental benefits it brings.

Social impacts

No social impacts have been identified in relation to this measure.

Administrative burden assessment

The WFD already lays down several obligations for Member States regarding the collection and reporting of waste data; therefore, the necessary data management systems are already in operation at national, regional and local levels. In the majority of the Member States, electronic data management systems are in use.

With regard to the adaptation of the reporting practices for the post-consumer textiles (i.e. those subject to measure 2.9 and defined in accordance with the approach in measure 1.1.1.2), the expected administrative burden is no or low cost, because the data is largely already collected and reported and changes would concern small scope adjustments, inclusion of certain operations that are currently voluntary, but concern data that would already exist with the economic operators.

In relation to data on pre-consumer, post-industrial and post-commercial textiles wastes, data collection and verification will require more significant adaptations from the current system used for reporting under the Waste Statistics regulation to a system that ensures textile specific data collection from the economic operators as well as data on waste management operations across the end-of-life chain and ensure traceability from the point of waste generation to its final treatment to attribute waste performance to specific Member States and enable monitoring to underpin possible future waste management target setting. The data collection processes should build on the existing ones applied for compliance with the Waste Statistics Regulation and in that process also improve the quality of data reported under that instrument.

The obligation entails data collection and verification by member States and reporting to the European Commission. Waste management operators will be required to generate and report data to competent authorities, as a minimum on the following: waste generated in tonnes, separate collection in tonnes, sorted in tonnes, prepared for reuse in tonnes, recycled in tonnes, energy recovery in tonnes, other recovery in tonnes, disposal in tonnes.

It is expected that in relation to existing waste management operators at the commercial level, the additional data to be reported would already be collected by:

- commercial collectors of waste for which volumes of waste generated and separately collected will already be recorded for contractual purposes between the producer and collector.
- commercial recyclers, where they differ from waste collectors, once again for contractual purposes between those who deliver waste for recycling and those who recycle it.
- the amounts sent for energy recovery and disposal will be collected at the point of recovery or disposal.

The elements missing are in relation to the volumes sorted and the volumes prepared for reuse. It is expected that for a large proportion of these wastes recycling rather than reuse will be the waste management operation of choice as these wastes are more suitable for recycling than reuse. Consequently, the biggest data gap will be in relation to volumes that are sorted for which additional data would be required to be gathered by those performing sorting prior to further treatment or re-use. This information should be readily available or generated by sorters based on the amounts entering a facility, sorted materials in bales for re-use and preparation for re-use and other fractions that are sorted for recycling, energy recovery or disposal.

In 2020, the last year of reported data, there were around 20 000 enterprises involved in waste collection in the EU and 7 700 involved in waste treatment and disposal[111]. However, only a proportion of those enterprises are likely to serve those producers involved in pre-consumer, post-industrial and post-commercial textiles wastes, particularly as such wastes represent just under 1 million tonnes of waste generated in comparison to 171 million tonnes of waste generated in the manufacturing sector overall[112]. A conservative estimate of 5% of all such enterprises handling textiles has been applied to assume that 1 385 waste management operators would be required to generate data each year.

Assuming the time taken for reporting of three days per year the total administrative burden would stand at just under €750 000 per year or approximately €540 per operator.

Finally, an additional 0.5 FTE would be required within the European Commission to adopt the necessary implementing acts setting out reporting formats and issuing guidance to the Member States (ESTAT) in support of those. Additional resources will also be required for the data flow management for all waste textiles (ESTAT).

Impact on SMEs and social enterprises

Given the majority of those involved as producers are SMEs they would tend to be impacted by the provisions to a larger extent than non-SMEs. However, the reporting obligations have been targeted to build on already existing obligations to minimise the additional administrative burden impacts that would result. Compliance costs for social enterprises linked to reporting obligations on waste collected and further treated would partially be new, since waste related reporting would already be a national obligation linked to waste permits that they generally have, but it is expected that the generation of the required data already takes place and would be offset by the reduction of costs in the management of residual waste in accordance with measure 2.9.

Stakeholder evidence

[111] Source Eurostat Annual enterprise statistics by size class for special aggregates of activities (NACE Rev. 2) as extracted in 2022 using 2020 data

[112] Eurostat, 2022. https://ec.europa.eu/eurostat/statistics-explained/index.php?title=Waste_statistics#Total_waste_generation

In both stakeholder workshops, industry, NGO and Member State stakeholders recognised that improved knowledge base across the end-of-life value chain is a significant barrier to improved waste management of used textiles and textile waste. Improvements in the reported data nationally and at EU level would address the need for more transparent data to allow for measurement of the environmental impact of the textile industry. This would need to be cross-boundary, with shared definitions, standardised indicators and reporting procedures, as well as accountability requirements[113][114]. If measured and tracked properly and consistently across the EU, the data would allow monitoring of the performance on waste prevention and residual waste and available feedstocks for developing preparation for re-use and recycling infrastructure[115]. Concerns were also raised over the cost implications and the added value of the more granular data on textiles in terms of environmental benefits.

Table 25 : Summary of impacts for measure 2.14

Stakeholder affected	Economic impacts	Environmental impacts	Social impacts
Producers, waste managers (encompassing collectors, sorters and managers)	This measure would create administrative burden on businesses for compliance with data reporting. The total administrative burden is estimated at 750 000 euro per year. Such costs might result in a barrier to entry for SMEs. However, it would improve the level playing field through harmonised data reporting requirements across the EU and improve the knowledge base on textile value		

[113] Interview with Teko & Svenskhandel
[114] Evidence from workshop
[115] Interview with Policy Hub

	chain to inform decisions on further investments in textile waste management and re-use operations.		
Public authorities	This measure would create administrative burden on public authorities to set up data collection systems and receive and verify additional data flows from economic operators and report to the Commission.		This measure would improve the level of data on textiles to enable better waste management planning.
Citizens			
All stakeholders		Limited direct environmental impacts are expected under this measure.	

Impacts on competitiveness

The following impacts on competitiveness have been assessed under this measure.

Table 26 - impacts on competitiveness of measure 2.14

Price competitiveness impacts	No significant price impacts have been identified under this measure.
Dynamic competitiveness impacts	No significant dynamic competitiveness impacts have been identified under this measure.
Export competitiveness impacts	No significant export competitiveness impacts have been identified under this measure.
Strategic	No significant strategic competitiveness impacts have been identified

competitiveness impacts	under this measure.

Option 3: Prescribing performance targets

One of the advantages of using a target-based approach is that it is a top-down approach that aims to reach the same goal for all Member States thereby ensuring a level playing field whilst providing flexibility to Member States as to how the targets are achieved in practice thereby respecting the subsidiarity principle. This means that the measures implemented can be tailored to the specific challenges of each Member State. Different types of targets can be set to encourage improvement in different aspects of waste management. These include targets for waste generation separate collection for reuse preparation for reuse and recycling as well as a combined reuse and recycling one. These have been considered in this assessment.

The biggest challenge in relation to setting targets is to make sure that the targets themselves remain realistic. The problem definition explains the data challenges that exist and measure 2.14 describes how they could be resolved. However, even with the most ambitious of timetables, consistent data to enable the setting of targets would realistically only be available in 2031 after 2 to 3 sets of annual data are available based on improved reporting framework under measure 2.14. Waste management targets are generally set with waste generation data as the denominator and with a baseline figure at a given starting year against which progress could be prescribed and subsequently assessed. However, the current data on textile waste generation is not robust partly because of the fragmented understanding of whether what is collected is waste or not. There is currently no sound method of estimating textile waste (collected and discarded in mixed municipal waste).

Key missing data/information to set sound targets and other uncertainties

- Assessment of the robustness of the data on re-use of textiles to be reported to the Commission for the first time in mid-2023 under the WFD.
- Estimated apparent consumption and textile waste generated need to be fine-tuned to better assess the amounts of unsold and returned goods as well as those that are stored by consumers in their households (difference between apparent textile consumption and post-consumer waste) even though these numbers are likely to be relatively small (around 5%).
- Updated assessment of the implementation of separate collection systems in the Member States.
- Improved projections of future capacities for recycling plants based on realistic capacity growth rates.
- Assessment to better understand the economic feasibility for recycling plants.
- Stakeholder feedback.

As explained in Annex 10, the JRC is working on a feasibility assessment for setting future recycling targets and their work is planned for conclusion by the end of 2023.

Setting targets based on non-robust data is risky because the levels set could be unrealistic and threaten the Member States' commitment to achieve them. Indeed, the commitment from Member States is an additional challenge as such. There are several examples when targets set under EU law have proven to be challenging to achieve, for example, those related to the objectives of the Water Framework Directive,[116] the recycling targets in the WFD itself and the Air Quality Directives[117]. The assessments of the status quo have demonstrated the challenges in achieving targets sometimes due to a series of problem drivers.

Therefore, the sections below for measures 3.1, 3.4, 3.5, and 3.8 examine the feasibility of the mechanism by which a target could be set in the future and the impacts of that process and not the actual levels of targets. In relation to setting a target for collection, a more detailed assessment based on an interim low ambition target is presented. The setting of targets is likely to have a number of common impacts as outlined below.

Economic impacts

Setting targets would involve additional costs in those Member States that are below the targets set and where relevant measures are not already foreseen to achieve them. Such impacts would include investments that would have to come from public or private funding to address several elements:

1. Collection infrastructure.
2. Sorting infrastructure
3. Repair infrastructure to enable reuse
4. R&D to develop recycling technologies at industrial scale
5. Recycling infrastructure to enable greater levels of recycling

As noted under Measure 2.9, the maximum likely additional cost per item would be an increase in product costs of 0.6%. In countries where EPR applies or is planned to apply then the costs would fall on the producer. Producers would either have to absorb those costs that would lower their profitability or increase the costs to consumers of the products themselves. Where EPR is not applied then costs may be met via the likes of disposal fees applied at the point of disposal or general taxation. The spread of costs between producers and consumers would be defined at the Member State level.

At the same time, however, increased collection of textiles and the potential resulting increased reuse and recycling would result in positive economic impacts in relation to the materials reused and recycled driving investment in the waste management sector and the second-hand textiles market.

[116] SWD (2019) 439
[117] SWD (2019) 427 final

Environmental impacts

The setting of targets would result in reductions in the environmental impact of textiles that would otherwise be predicted to remain in residual waste and subsequently be disposed. This would reduce the environmental impacts that currently result from the disposal of textiles including GHG emissions and air pollution water pollution and soil and groundwater impacts including in relation to microplastics.

Social impacts

Additional collection would be expected to lead to additional employment in the collection and downstream sorting and further treatment of materials that would otherwise be disposed of. Furthermore, in relation to the social impacts of waste textiles in receiving environments targets would effectively lower these effects that is particularly important given the large proportion of EU used textiles exported to third countries where environmental controls are generally lower than those employed within the EU.

Impacts on competitiveness

The following impacts on competitiveness have been assessed under this group of measures qualitatively. It should be noted that actually quantifying these impacts is not possible except in relation to measure 3.6. This is as a result of the fact that no specific targets are proposed for the other target measures and the extent of the targets and the distance away from those targets would determine the majority of competitiveness impacts.

Table 27 - impacts on competitivenss of measure 3.1, 3.4, 3.5 and 3.8

Price competitiveness impacts	Price competitiveness impacts would generally be related to the level of compliance with the targets foreseen under the baseline and the decisions taken at the Member State level with regard to how achievement of the targets themselves should be financed in the absence of EPR. Taking, for example, targets on reuse – for those Member States with higher levels of reuse and repair in place the costs of complying with a reuse target would be lower than those for which reuse rates are low and the repair sector is limited. In the case of Member States with low rates and reuse and repair the investments necessary would be larger than for other Member States and the costs to comply would be higher, placing pressure on producers, customers and or waste managers depending on the manner in which a Member State chose to look to fund the necessary investments to comply with the target. This in turn may affect the price competitiveness of that Member States textile production and discarded textile management enterprises in comparison to Member States where the necessary investments have been made.
Dynamic	These measures have the potential to share improve research and

competitiveness impacts	development across the EU in relation to waste prevention, reuse and recycling depending on the stringency of the targets set with more stringent targets generally driving the need for greater innovation to achieve those targets.
Export competitiveness impacts	The measures are likely to reduce the volumes of used textiles exported from the EU to third countries. This would potentially reduce the incomes of used textile exporters within the EU as whole due to the reduced volumes available to market.
Strategic competitiveness impacts	The measures offer the opportunity to reduce the need for imports of textiles in the future as greater reuse and repair within the EU replaces the need for new textile goods to be purchased for those targets that address prevention and reuse and improvements in recycling for those measures addressing recycling reducing the need for imports of virgin textile materials – in particular natural fibres for which the EU relies heavily on third country imports.

Measure 3.1 – Setting an EU textile waste reduction target

The objective of this measure would be to drive Member States to reduce textile waste generated in the first place. In terms of implementation this could be achieved through measures addressing reduction of textile consumption for example through information campaigns for consumers or through specific support to the textile repair and reuse sectors. It would also look to improve the way Member States collect textiles for reuse as a way of reducing textile waste by diverting reusable that are currently disposed of.

Impact on SMEs and social enterprises

Most producers of textiles within the EU are SMEs as are most actors involved in collecting textiles that are mainly social enterprises. The separate collection obligation for textiles would at least in part be expected to be implemented by these enterprises in collaboration with Member States. As noted above with increasing collection the revenue from reuse and recycling is also likely to increase to partly offset the additional costs that will be required to implement the sorting requirements. The intention of the measure is to avoid disrupting the business model of social enterprises and with this in mind Member States should work alongside social enterprises to limit any such disruption in meeting this target. Therefore, a waste reduction target would be likely to fall mainly on SMEs to a certain extent on social enterprises. The precise impacts would be dependent upon the approaches employed by Member States to meet the targets concerned.

Stakeholder evidence

All stakeholders in both of the textile workshops agreed that there was a need to reduce the fraction of textiles in mixed household waste. However, it was suggested that, where an EPR is

established, in its early stages targetsare not a priority and could be implemented later and – where applied – should focus on waste prevention and resource efficiency[118] [119]. Some actors notably Member States classified the measure as not useful. The feedback outlined that the measures need to go beyond solely targets[120] to avoid the potential for divergent approaches taking place across Member States which could cause uncertainty and complexity and unnecessary costs to the economic operators[121]. There was sentiment that unless measures are mandatory they will not be implemented. The question was also raised of how the targets would be enforced in view of data uncertainty and the design of the EPR[114].

In designing the targets there were questions in the second stakeholder workshop over whether this would be directed towards preventing the generation of textile waste through circular business models or by reducing what is placed on the market. There was also uncertainty over whether the targets are set at the national member state level or would require further reporting or independent initiatives and who would need to report as well as the processes for doing so. Comments from the workshop were that targets should be used to measure the overall flow of resources consumed and waste produced in the market while reducing the environmental footprint of textiles. There were questions on how this would be defined and agreement that this would need to be designed carefully to ensure it was clearly defined including whether it would be per kg per capita etc and would need to be supplemented by a reuse and recycling and consumption reduction targets and material consumption reduction targets[122]. This could be further incentivised through eco-modulation under EPR schemes and financial penalties for not meeting targets.

Waste reduction targets are difficult to operationalise. Some actors – such as commercial or C2C platforms – could be incentivised through regulation to monitor and report textile waste prevention. Overall, the targets were considered not strong enough to create the change required with participants suggesting investment in infrastructure that can allow for separate collection and adoption of circular business models (i.e. product use extension) is more critical.

Table 28 : Summary of impacts for measure 3.1

Stakeholder affected	Economic impacts	Environmental impacts	Social impacts
Producers, waste managers (encompassing collectors, sorters and	Increases cost of textile waste data collection and reporting.		

[118] Interview with Ellen MacArthur Foundation.
[119] Interview with Recycling Network.
[120] Interview with Eurocommerce.
[121] Interview with Recycling Netwerk Benelux.
[122] Evidence from workshop

managers)	Enable a level playing field as all operators would contribute to the reduction target, subject to specific characteristic.		
All stakeholders		Improve air, soil and water quality thanks to reduced waste disposal practices. Protect landscapes thanks to reduced landfilling.	Increase information and data on textile waste.

Measure 3.4 – Setting a preparation for reuse target for textiles

The objective of this measure would be to drive Member States to improve their reuse of textiles by setting a realistic preparation for reuse target in comparison to solely relying on the application of the separate collection of textiles under Article 11(1) of the WFD. Preparing for reuse in the context of textiles means checking, cleaning or repairing recovery operations by which textile products that have become waste are prepared so that they can be reused without any other pre-processing. Presently the costs of preparation for reuse within the EU generally mean that such preparation is limited as the economic costs of such preparation are higher than the value added to the repaired product. However, one of the expected impacts of the EU strategy for sustainable and circular textiles is to facilitate the reuse and repair sector such that repair within the EU becomes more profitable and a preparation for reuse target would be set with this expected outcome in mind.

Table 29 : Summary of impacts for measure 3.4

Stakeholder affected	Economic impacts	Environmental impacts	Social impacts
Producers, waste managers (encompassing collectors, sorters and managers)	Increased cost of data collection and reporting. Enable a level playing field as all operators would contribute to the reduction target		

	subject to specific characteristic		
Public authorities	Increase the administrative costs of setting a preparation for reuse target developing indicators for monitoring progresses, ensure compliance and update upon need. Increase costs of data collection and reporting on prepared for reuse waste.		
All stakeholders		Improve air soil and water quality thanks to reduced waste disposal practices.	Increase information and data on prepared for reuse waste. Availability to consumers of low cost sustainable textile alternatives to new textiles.

Measure 3.5 – Setting a reuse target

The objective of this measure would be to drive Member States to improve their reuse of textiles by setting an overall reuse target that they should achieve in comparison to a baseline. Reuse poses an additional challenge in terms of how to measure it. The World Economic Forum (WEF) recently examined the need for a robust and standardised framework for reuse measurement[123]. The WEF Consumers Beyond Waste initiative focussed most of its effort on primary plastic packaging. The two reuse metrics to be piloted in 2023 are less relevant for textiles as they focus on the total number of loops a packaging unit achieves over the course of its lifetime as well as

[123] World Economic Forum, 2022. A robust and standardized framework for reuse measurement is needed. Here's why

the share of volume of products designed or developed to be reused. Specifically in relation to textiles Finland through the Finnish Environmental Institute collected data on C2C and B2C reuse volumes of textiles. The data is collected through a survey sent to online and physical second-hand shops. Finland also uses a consumer barometer to provide insights into consumer behaviour concerning reuse. Further approaches are also developed in Flanders and Ireland.[124]

In accordance with Commission Implementing Decision (EU (European Union)) 2021/19 on reuse, the EEA is piloting a strategy for reporting on reuse by developing an online reporting tool, that will be available in April 2023. By combining quantitative and qualitative data the reported data on reuse will improve the understanding of the reuse sector and the impacts of the measures that the Member States have taken on waste prevention. Member States have developed different methods to collect the quantitative data on reuse flows. It is therefore necessary to await the analysis of the data submitted by Member States in accordance with this reporting obligation to determine the scope for further improvement of data on re-use of textiles and the feasibility of setting re-use targets at EU level.

Stakeholder evidence

During the discussions concerning Commission Implementing Decision (EU (European Union)) 2021/19 on reuse and development of the decision a main concern from the Member states were the administrative work that it may take to collect and report data on reuse. It was decided that in order to monitor reuse and to gain a better understanding of the reuse sector the reporting should include a combination of qualitative and quantitative data. The quantitative data should be reported every third year and the qualitative data annually.

Participants to the second textile stakeholder workshop agreed that there is not enough data to be able to set a definitive baseline and robust targets at the moment. Therefore, setting a reuse target cannot be considered at this point[125]. Additionally, stakeholders were concerned that as there is not yet the capacity for reuse systems to deliver at volume the market isn't ready to respond to reuse targets. Feedback from the workshop outlined that the development of reuse targets should be done in consultation with industry experts and progressively increased over time as the infrastructure and data permits. This would allow for Member States and market demand (boosted by ESPR measures) / capacity to expand symbiotically in keeping with the aims of the EU strategy for sustainable and circular textiles in relation to profitable reuse and repair services. Collaboration with industry and Member States would also ensure that targets are reasonable, and stakeholders advocated for targets not to be set below what is already being achieved in some states. Importantly as with most measures harmonisation of monitoring and reporting is vital. However, stakeholders noted that this could be challenging as reused textiles are not considered waste therefore language and terminology would need to be reflected accurately in

[124] Flanders (PDF) Measuring reuse in Flanders: The first reuse mapping study (researchgate.net) and Ireland Research_Report_405.pdf (ctc-cork.ie).

[125] Evidence from stakeholder workshop

these. It was suggested that reuse targets should be developed in line with prepare-to-reuse targets but only focusing on waste and donations (excluding C2C platforms). Some feedback states that reuse targets are not practical or feasible and targets should be focused on prevention because even with better reuse and recycling issues like fast fashion are not being addressed and we should always be aiming for moving up the waste hierarchy.

Preparation for reuse targets were seen as an option which could form part of the EPR with a recycling target on the fraction that would not be prepared for reuse (remaining fraction[126].) An example of this in action is the Netherlands that uses a combination of targets relating to preparation for reuse and recycling and allow producers to choose[127]. Separate reuse and recycling targets would be required to ensure everything doesn't end up being recycled for instance design for recycling. Reuse should only be considered if it takes place within Europe due to lack of end-of-life information for exports out with the area. Additional measures would also need to be in place to ensure preparation leads to reuse. This would also drive the reuse market within the EU boundaries[128]. Another option when developing the target could be to consider the textiles that currently end up in municipal waste to increase the amount of material entering preparation for reuse and decreasing household waste[129]. Where respondents agreed with the targets there was still caution against setting a target straight away. Due to other legislative changes – namely the 2025 textiles collection obligation – there will be a significant increase in collection of non-reusable fractions of textile which will make it non-feasible to significantly increase prepare-for-reuse in the first few years. There is also a lack of harmonised data for collection rates which would be necessary to provide a reporting framework and baseline[130].

Like other target-based measures stakeholder mentioned potential challenges in measurement and enforcement. There were questions raised around who would measure the data and how it could be collected. It was felt that prevention was an easier metric to measure as this can be monitored by amounts POM[131]. There were some interviewees who felt the measure was relevant and useful[132] [133]. It was suggested the preparation-for-reuse would be better suited as a KPI which would take into account social aspects of the production process[134]. It was felt that if measured and tracked properly the measure could support the reduction of textiles ending up in landfills or incineration and increase those used as feedstocks; however, this would depend on them being collected and sorted efficiently which could improve the recycling infrastructure.

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[126] Interview with Ellen MacArthur Foundation
[127] Interview with Recycling Netwerk Benelux
[128] Feedback from workshop
[129] Interview with TOMRA.
[130] Interview with TOMRA.
[131] Interview with Eurocommerce.
[132] Interview with Policy Hub.
[133] Interview with RREUSE.
[134] Interview with Municipal Waste Europe.

An interviewee expressed that they did not see the purpose of a target as the market is self-regulating. As reuse operators and sorters will seek to make the maximum value from materials the commercial process will automatically drive the preparation for reuse element[135]. Currently, collection and sorting are financed by reuse and only around 10% of what is collected can be resold in the EU as the market requires a higher quality than elsewhere. As the process of sorting is labour intensive the costs for this increase every year but the quality decreases. There is therefore a significant cost implication for this which – if not supported through a wider EPR or national system – will fall to the businesses. This will further drive down the volume of textiles able to be reused. Stakeholders highlighted that to ensure textile reuse there must be a high-level of reusable items or demand for recycling which is economically feasible[136].

Table 30 : Summary of impacts for measure 3.5

Stakeholder affected	Economic impacts	Environmental impacts	Social impacts
Producers, waste managers (encompassing collectors, sorters and managers)	Increase cost of data collection and reporting. Enable a level playing field as all operators would contribute to the reduction target, subject to specific characteristics.		
Public authorities	Increase the administrative costs of setting a preparation for reuse target, developing indicators for monitoring progresses, ensure compliance and update upon need. Increase costs of data collection and		

[135] Interview with Euric.
[136] Interview with Euric.

	reporting on reused waste.		
Citizens	Greater availability of options for the purchase of second hand textile products at a lower cost		
All stakeholders		Improve air, soil and water quality thanks to reduced waste disposal practices. Protect landscapes thanks to reduced landfilling.	Increase information and data on prepared for reuse waste.

Measure 3.6 – Setting a separate collection target for textile waste

The apparent lack of sufficient collection infrastructure to manage the expected volumes of textile waste generated hampers the ability further down the textile management process to ensure that textiles that could be reused or recycled are diverted from residual waste. On the other hand, the uncertainty of the available reuse possibilities and the immaturity of several recycling technologies tend to dis-incentives Member States from speeding up the setting up of efficient separate collection systems.

Economic impacts

Setting a 50% separate collection target would involve additional costs only for those Member States and producer responsibility organisations (PROs) that are unlikely to meet a 50% collection target by 2035. The list of Member States concerned and the likely shortfall in tonnes is presented below.

Table 31 - Additional tonnes to be collected to achieve a 50% collection target

Member State	Predicted collection rate in 2035	Additional tonnes to be collected to hit 50% collection target
BG	45.50%	1,321
CY	47%	77
CZ	45.50%	3,122
EE	44%	1,236
EL	45.50%	3,922
ES	47%	11,218
HR	44%	2,925
HU	45.50%	3,162
LV	42.50%	1,534
PL	45.50%	14,489
PT	44%	7,652
RO	45.50%	5,964
SI	42.50%	926
SK	42.50%	2,909
Total		60,456

The costs of collection are dependent on the type of additional infrastructure that would be required. In keeping with most collection being achieved by separate bins, it is considered that shortfalls in separate collection would be met by adding additional separate collection bins for the Member States concerned.

This measure would also have a benefit in reducing disposal of textiles in the household mixed waste. Treatment of mixed waste is more expensive that treatment of separately collected waste. This benefit would be apparent to those responsible for municipal waste collection, typically municipalities. In cases where the polluter pays principle is applicable, i.e., where households pay (or may more) for their mixed waste than for separately collected waste, this saving would be directly apparent to households. It was not possible to quantify this benefit as the applications of the polluter pays principle is not applied by all municipalities and where it is, it is implemented in a variety of ways, by weight, by volume, by collection, by bag etc.

Data from the CESME project that considered the Humanita textile recycling programme in BG[137] indicates that addressing approximately 3 400 tonnes of textile per year came with combined container transport and storing costs of 367 000 euro per year leading to an average cost of 108 euro per tonne collected. This figure appears low in comparison to data from the ECAP study on used textile collection in European Cities[138] that indicates costs of collection in

[137] https://www.cesme-book.eu/book/level-1-d/3.1-best-practices/3.1.2-humanita-textile-recycling
[138] ECAP, 2018. Used Textile Collection in European Cities

the NL of 165 euro per tonne. In applying these costs to the Member States above would lead to the following additional annual collection and onward sorting and treating costs:

Table 32 - Additional costs to achieve a 50% collection target

Member State	Additional Tonnes to be collected to meet a 50% separate collection target	Additional collection costs in EUR	Additional sorting and treatment costs in EUR
BG	1,321	217,965	858,650
CY	77	12,705	50,050
CZ	3,122	515,130	2,029,300
EE	1,236	203,940	803,400
EL	3,922	647,130	2,549,300
ES	11,218	1,850,970	7,291,700
HR	2,925	482,625	1,901,250
HU	3,162	521,730	2,055,300
LV	1,534	253,110	997,100
PL	14,489	2,390,685	9,417,850
PT	7,652	1,262,580	4,973,800
RO	5,964	984,060	3,876,600
SI	926	152,790	601,900
SK	2,909	479,985	1,890,850
Total	60,457	9,975,405	39,297,050

The additional collection and sorting costs remain relatively low at 39.2 million euro. This reflects both the predicted distance to 50% collection by 2035 where most Member States would be close to that target already as well as the scale of textile waste generation where the countries listed are generally smaller generators of textile waste in comparison to DE or FR that would already be collecting over the 50% target by 2035 (and in the case of DE is already collecting beyond that target). In countries where EPR applies or is planned to apply then the costs would fall on the producer. Producers would either have to absorb those costs that would lower their profitability or increase the costs to consumers of the products themselves. Where EPR is not applied then the costs of additional collection and sorting may be met via the likes of disposal fees applied at the point of disposal or general taxation. The extent of these additional costs is difficult to determine. As noted in Annex 4, the total costs for all wastes account for an approximate increase per product of around 0.6%. However, as the additional volumes listed above that fall above the baseline are lower (in some cases up to 7.5% more at a Member State level in comparison to the baseline) then maximum increase would be 7.5% of the 0.6% maximum i.e. 0.045%. Consequently, were the additional costs of collection, sorting and treatment to be applied for the additional volumes only and the cost spread over all relevant textile products sold in total then a very conservative estimate would place those costs at an additional cost of 0.1% in the countries concerned by requiring additional action to meet the

target. The extent to which these costs may be absorbed by producers or consumers is not possible to be separated and will rely on decisions at the Member State level.

At the same time there would be benefits from the materials recovered. The baseline assumes that 42% of what is separately collected would either be close-loop or open loop recycled representing 18 250 tonnes additionally going to closed loop recycling and 7 150 tonnes going to open loop recycling. Using values from Fashion for Good [139] an additional ~30 200 tonnes of reusable textiles collected would have a value of 23 million euro per year and the additional recyclable material a value of 5 million euro per year. Only 8% of separately collected waste would be disposed[140].

Additional costs would be expected for competent authorities to enforce compliance with a collection target. However, the activities that are required to contribute to the target are already required to be managed by competent authorities under existing waste permitting requirements for collection, sorting and treatment facilities; therefore, allowing for synergies with the existing enforcement processes. Furthermore, given the relatively modest increases in tonnes to be collected by the Member States concerned as a maximum such costs would incur a 15% increase in total in comparison to the baseline for those Member States furthest from the 50% target i.e. LV, SI and SK, with lower total cost increases expected for the other Member States that are predicted to be closer to the 50% target. The additional reporting costs under this measure are addressed under Measure 2.14. In case the reporting would be through PROs, the administrative burden would be even lower given that PROs would need to report the required data to assess the separate collection target anyway. There would also be no additional administrative burden on Member States.

However, as shown in Annex 10, the heterogeneity of predicted separate collection rates across different studies may make it challenging to set a specific target at this stage and should therefore be carefully considered.

Environmental impacts

The additional collection rate that would be applied to the Member States concerned to hit a 50% separate collection target is likely to reduce the environmental impact of textiles that would otherwise remain in residual waste and subsequently be disposed. This would reduce the environmental impacts that currently result from the disposal of textiles including GHG emissions and air pollution, water pollution and soil and groundwater impacts including in relation to microplastics.

Social impacts

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[139] Fashion for Good, 2021. Sorting for circularity Europe – an evaluation and commercial assessment of textile waste across Europe

[140] Fashion for Good, 2021. Sorting for circularity Europe – an evaluation and commercial assessment of textile waste across Europe

Additional collection would be expected to lead to additional employment in the collection and downstream sorting and further treatment of materials that would otherwise be disposed of.

Impact on SMEs and social enterprises

Given the majority of those currently involved in collecting textiles are SMEs, mainly social enterprises, the obligation to collect textiles is expected to fall at least on these enterprises in collaboration with Member States. As noted above, with increasing collection the revenue from reuse and recycling is also likely to increase to offset the additional costs that will be required to implement the sorting requirements. The intention of the measure is to avoid disrupting the business model of social enterprises and with this in mind Member States should work alongside social enterprises to limit any such disruption in meeting this target.

An additional 0.2 FTE would be required within the European Commission to adopt the necessary implementing act setting out harmonised methodology for the measurement of the collection performance by the Member States.

Administrative burden assessment

In order to inform the target and compliance with the target data would be required to be complied and reported at the Member State level in relation to those wastes or products forming both the numerator and denominator. These requirements would fall on all Member States and not just those for which additional collection would be required to be implemented above the baseline. The full costs of this burden are addressed in Measure 2.14.

Impacts on competitiveness

The following impacts on competitiveness have been identified under this measure:

Price competitiveness impacts	Impacts of price competitiveness are linked to the possible increases in collection, sorting and treatment as described under economic impacts above. However, given the likely volumes impacted by this measure no significant price impacts have been identified.
Dynamic competitiveness impacts	No significant dynamic competitiveness impacts have been identified under this measure.
Export competitiveness impacts	No significant export competitiveness impacts have been identified under this measure.
Strategic competitiveness impacts	No significant strategic competitiveness impacts have been identified under this measure, albeit limited amounts of additional recycled fibres would be recovered in comparison to the baseline as described under economic impacts above.

Stakeholder evidence

The consensus was that increasing collection is only useful to the extent that there is available infrastructure to manage those quantities. Typically, as this will lead to an increase in material

flows and end of life considerations, there must be sufficient collection and sorting in place to manage this and where targets are implemented, these need to be carefully designed and possibly phased in[141]. It was suggested at the second stakeholder workshop that separate targets for household and commercial waste should be outlined in the WFD and there was general agreement that targets should be aligned with the waste hierarchy.

Table 33 : Summary of impacts for measure 3.6

Stakeholder affected	Economic impacts	Environmental impacts	Social impacts
Producers, waste managers (encompassing collectors, sorters and managers)	Increase cost of data collection costs 123 million per year. Increase sorting costs 98.5 million per year. Increased reporting costs. Enable a level playing field as all operators would contribute to the reduction target, subject to specific characteristic. Recovery value of 57.5 from reused textiles and 12.7 from recycled textiles.		
Public authorities	Increase the administrative costs of setting a preparation for reuse target, developing indicators for monitoring		

[141] Feedback from workshop

	progresses, ensure compliance, and update upon need. Increase costs of data collection and reporting on prepared for reuse waste.		
All stakeholders		Improve air, soil and water quality thanks to reduced waste disposal practices. Protect landscapes thanks to reduced landfilling.	Increase information and data on prepared for reuse waste.

Measure 3.8 – Setting a recycling target for textiles

The objective of this measure would be to drive Member States to improve their recycling of textiles and thereby increase recycling capacity by setting a realistic recycling target that takes into account likely changes in recycling capacity and technologies – see for example the ReHubs initiative that looks to achieve 2.5 million tonnes of fibre-to-fibre recycling by 2030. This target would be in comparison to solely relying on the application of the separate collection of textiles under Article 11(1) of the WFD to provide more textiles available for recycling.

Taking inspiration from the way FR and NL have set combined targets for reuse and recycling the objective of this measure would be to drive Member States to improve both their reuse of textiles and their recycling of textiles by setting a realistic combined target. This would avoid the undesired effect of a recycling target where textiles that could be treated further up the waste hierarchy would be sent to recycling to achieve the target. This would also offer some flexibility to Member States to achieve the combined target in the way that is more appropriate based on the size and prospects of the reuse market as well as the availability of recycling facilities.

Stakeholder evidence

The apparel and footwear industry[142] considers that any recycling target should be set in consultation with the industry experts and that the targets should be progressively increased over time in line with the development of relevant infrastructure in the Member States and the market

[142] Policy Hub call for evidence position paper

demand for secondary raw materials. National and regional public waste organisations echoed the need to align the targets to relevant infrastructure.[143]

Social enterprises active in reuse, repair and recycling as well as MWE and the Swedish environmental agency[144] emphasised the need to prioritise reuse over recycling in keeping with the waste hierarchy and that this needs to be considered in the setting of recycling targets that may otherwise result in reusable materials being sent for recycling. A recycler supports mandatory targets on recycling and recycled content at the EU level to both boost demand and supply for recycling.[145]

In addition, during the second textiles workshop, stakeholders called for recycling targets being established which – supported by clarity and consistency – would help create a market for secondary material and facilitate collection and prioritised use[146].

Table 34 : Summary of impacts for measure 3.8

Stakeholder affected	Economic impacts	Environmental impacts	Social impacts
Producers, waste managers (encompassing collectors, sorters and managers)	This measure would increase cost of data collection and reporting. This measure would enable a level playing field as all operators would contribute to the recycling, subject to specific characteristic. This measure would require additional investment in recycling infrastructure in order to meet the		

[143] MWE
[144] REEUSE, MWE and the SE EPA
[145] TOMRA call for evidence position paper
[146] Evidence from workshop

	targets set. This measure would recover the economic value of textile fibres through recycling in comparison to their loss through recovery and/or disposal.		
Public authorities	This measure would increase the administrative costs of setting a recycling target, developing indicators for monitoring progresses, ensure compliance, and update upon need. It would increase costs of data collection and reporting recycling of textile waste.		
All stakeholders		This measure would improve air, soil, and water quality thanks to reduced waste disposal practices. Similarly, it would protect landscapes thanks to reduced landfilling.	This measure would increase information and data on recycling. This measure would increase employment in the recycling sector.

Overall impacts of the measures

For textiles, the table below summarises the net impacts of the measures that are included in each option. For each measure, the direction of impact is indicated as positive, negative or neutral using + - and +/- to indicate these impacts. Additionally, where indirect impacts are identified these are shown between brackets, e.g. (+) would demonstrate an indirect positive impact. The table below sets out the economic, environmental and social impacts by measure covering all relevant stakeholders: public authorities, industry (including SMEs), citizens and workers and third countries. For those measures that contained alternatives, the table presents the ratings for the selected alternatives within each measure.

Table 35 : Overview of the economic environmental and social impacts of the measures

Policy option and measure	Economic impacts	Environmental impacts	Social impacts	Competitiveness impacts	Comments
Option 1 - Supporting Member States to implement and enforce current WFD provisions.					
Measure 1.1 – Clarifying definitions in relation to textiles and textile waste	+	+	+	+/-	Measure 1.1 is split into two sub-options, the first of which has three alternatives to address the scope in relation to textiles and second of which has two alternatives to address the definition of textile waste. Alternatives 2 and 3 in relation to the definition of textiles would offer greater clarity and a greater scope for admin burden reduction in comparison to sub-option 1. An increase in scope under sub-option 1 would also increase costs of management of textile wastes, with the greatest impact on price competitiveness falling on those Member States that have taken little action to address textile wastes to date that would have an even broader task to comply. All three definition alternatives would incentivise research and development to manage the textiles listed as well as providing potential feedstocks of recycled textile materials reducing reliance on third country imports of such materials in future. With regard to the definition of waste, two sub-options are considered. The first one would possibly lead to a negative economic impact for producers and waste managers as a result of deterioration in the quality to textiles collected as well as increasing administrative costs for a minority of collectors. The second sub-option would lessen environmental controls compared to

Policy option and measure	Economic impacts	Environmental impacts	Social impacts	Competitiveness impacts	Comments
					the baseline.
Measure 1.2 - Adopting EU wide waste prevention indicators for textiles	+	+	+	+	The reduction of textile waste generation is strongly linked to waste prevention at the top of the waste hierarchy. The success of this measure is dependent on the information available and the reporting by Member States but would set prevention indicators to gauge efforts across the EU in textile waste prevention as week as to assist in the identification of best practices in individual Member States that could be applied in others. Additionally, support to the reuse and repair sectors and a reduction in imports of textiles in the future would provide a boost to EU competitiveness.
Measure 1.3 – Providing Member States with guidance and support in dialogue on the management of textile waste between actors involved	+	+	+	+/-	The measure would imply resourcing and related costs to develop guidance and recommendation as well as to operate a stakeholder platform for dialogue between stakeholders. The cost of guidance is 135 000 euro per guidance developed. These costs are expected to be outweighed by the economic benefits resulting from these new tools. Impacts of price competitiveness are linked to the possible increases in collection, sorting and treatment with those Member States that currently collect a small share of textile wastes and have little capacity for sorting and treatment impacted with cost impacts falling on the waste management sectors in each of those Member States accordingly. At the same time the measure would improve dynamic competitiveness by

Policy option and measure	Economic impacts	Environmental impacts	Social impacts	Competitiveness impacts	Comments
					sharing best practices, as well as increasing reuse and recycling and, thereby, lessening dependence on third countries for textiles and textile products in future.
Option 2 – Proposing additional measures to align waste management to the waste hierarchy.					
Measure 2.5 – Setting sorting obligations for separately collected textiles and textiles waste	-	+	+	+/-	There would be additional recovery of the value of from textile wastes of up to 533 million euro for reuse and 117 million euro for recycling per year. However, there would be additional costs for sorting waste as a result of a sorting obligation of 913 million euro per year. Over 70% of these costs would likely be recovered by the additional value of textiles available for reuse and recycling. However, the impacts would still be overall negative economically. At the same time the environmental impacts of these materials would be averted, most notably in terms of GHG emissions via a reduction of 160 000 tonnes of CO2eq emissions per year whilst providing additional employment of up to 8 740 FTE. The largest price competitiveness impacts are likely to be felt in those Member States that have significant levels of collection but low levels of national sorting capacity as the need for additional sorting capacity under this measure potentially drives up competition for the sorting capacity available. At the same time research and innovation in sorting and treatment would be supported by this measure as well as a reduction on reliance on imports of textiles and textile products from third countries.

Policy option and measure	Economic impacts	Environmental impacts	Social impacts	Competitiveness impacts	Comments
Measure 2.6– adopting end of waste criteria	+	+	+	+	The development of EU wide end of waste criteria will address the issue of inconsistent approaches to how this applies to textiles in different Member States at present. This should assist in the subsequent reuse market, allowing textiles that have reached end-of-waste to move freely whilst ensuring relevant pre-treatment has taken place to minimise the environmental and social risks of such materials. This measure has the potential to incentivise the repair and reuse market as well as the recycling markets in Member States by potentially allowing easier movements of reusable and recyclable materials that would no longer be categorised as waste in the future whilst reducing the need for imports of textiles and textile products from third countries.
Measure 2.8– Setting requirements for the shipments of textiles	-	+	+	+/-	The economic costs largely relate to additional administrative costs related to record keeping of 208 euro per operator. Minor price competitiveness impacts are likely to be felt by those Member States that most heavily rely on exports of discarded textiles to third countries.
Measure 2.9 – Mandating the use of EPR	+/-	+	+	+/-	Economically the measure would increase the costs of placing textile products on the market as a result of the EPR fees applied. Additionally, costs of application of EPR would disproportionately affect micro-enterprises should they not be excluded from the provisions

Policy option and measure	Economic impacts	Environmental impacts	Social impacts	Competitiveness impacts	Comments
					on EPR. At the same time the measure would enable a playing field across the EU in relation to textiles EPRs, would simplify administrative practice, would result in additional support to the reuse and repair sector as well as the textile recycling sector. This is the reason for the +/- approach to determining economic impacts. The total sift in costs for effective textile waste management in the EU of 2.2. billion euro would also lead to the recovery of value of textiles for reuse of 1.1 billion euro and recycling value of 167 million euro. Impacts of price competitiveness are linked to the shift of the costs of managing textiles at the point of discard in comparison to the status quo with the largest impacts on those Member States that currently lag behind on textile waste management. At the same time, better organised funding can be targeted at repair and recycling markets as well as reductions in the need for imports of textiles and textile products from third countries.
Measure 2.14 – Setting reporting obligations for textiles	-	+	+	NA	The economic costs relate to additional administrative burden related to new reporting requirements in particular for businesses that currently report little data in terms of their waste generation of €750 000 for the EU overall (508 euro per operator). At the same time, it would set a more level playing field for reporting requirements across the EU.

Policy option and measure	Economic impacts	Environmental impacts	Social impacts	Competitiveness impacts	Comments
Option 3 – Prescribing targets and restrictions					
Measure 3.1 – Setting an EU textile reduction target	+/-	+	+	+/-	The measure would increase the cost of textile waste data collection and reporting that accounts for the negative economic impact. However, the measure would also enable a more level playing field via a common target on textile reduction across the EU resulting a positive economic impact. It is considered at present that setting a target at the EU level is not feasible due to shortcomings in the data presently available. Price competitiveness impacts would generally be dependent upon the level of compliance with the target set, with Member States far behind a target facing the greatest price competitiveness impacts. At the same time, support for research and innovation and reduced reliance on imports from third countries would be likely to result.
Measure 3.4 -setting a preparation for reuse target for textiles	+/-	+	+	+/-	This measure would carry administrative costs in the development and monitoring of compliance against the preparation for reuse target set. It would also require additional investment in infrastructure for the collection, sorting and reuse and repair sectors. At the same time, the economic value of the textiles otherwise disposed of would be better recovered through increased reuse. It is considered at present that setting a target for preparation for reuse at the EU level is not feasible due to shortcomings in the data presently

Policy option and measure	Economic impacts	Environmental impacts	Social impacts	Competitiveness impacts	Comments
					available. Price competitiveness impacts would generally be dependent upon the level of compliance with the target set, with Member States far behind a target facing the greatest price competitiveness impacts. At the same time, support for research and innovation and reduced reliance on imports from third countries would be likely to result.
Measure 3.5 - Setting a reuse target for textiles	+/-	+	+	+/-	This measure would carry administrative costs in the development and monitoring of compliance against the reuse target set. It would also require additional investment in infrastructure for the collection, sorting and reuse and repair sectors. At the same time, the economic value of the textiles otherwise disposed of would be better recovered through increased reuse. It is considered at present that setting a target for reuse at the EU level is not feasible due to shortcomings in the data presently available. Price competitiveness impacts would generally be dependent upon the level of compliance with the target set, with Member States far behind a target facing the greatest price competitiveness impacts. At the same time, support for research and innovation and reduced reliance on imports from third countries would be likely to result.
Measure 3.6 - Setting a separate collection target for textiles waste	+/-	+	+	+/-	This measure would carry administrative costs in the development and monitoring of compliance against the collection target set. It would also require additional investment in infrastructure for

Policy option and measure	Economic impacts	Environmental impacts	Social impacts	Competitiveness impacts	Comments
					the collection of textiles with likely increases in sorting, reuse and recycling infrastructure required a as a result of the additional textiles collected. At the same time, the economic value of the textiles otherwise disposed of would be better recovered through increased reuse and recycling. Given the already existing obligation with regard to separate collection of textiles under Article 11(1) of the existing WFD this target could be set based on the data available. Limited competitiveness impacts were identified for this measure.
Measure 3.8 – Setting a recycling target for textiles	+/-	+	+	+/-	This measure would carry administrative costs in the development and monitoring of compliance against the recycling target set. It would also require additional investment in infrastructure for the collection, sorting and recycling sectors. At the same time, the economic value of the textiles otherwise disposed of would be better recovered recycling of textiles that are not suitable for reuse. It is considered at present that setting a target for recycling at the EU level is not feasible due to shortcomings in the data presently available. Price competitiveness impacts would generally be dependent upon the level of compliance with the target set, with Member States far behind a target facing the greatest price competitiveness impacts. At the same time, support for research

Policy option and measure	Economic impacts	Environmental impacts	Social impacts	Competitiveness impacts	Comments
					and innovation and reduced reliance on imports from third countries would be likely to result.

Table 36 : Overview of the costs and benefits and overall balance of the measures

Policy option and measure	Costs	Benefits	Competitiveness impacts	Net impacts
Option 1 - Supporting Member States to implement and enforce current WFD provisions				
Measure 1.1 – Clarifying definitions in relation to textiles and textile waste	+	+	+/-	Net positive
Measure 1.2 - Adopting EU wide waste prevention indicators for textiles	+	+	+	Net positive but limited
Measure 1.3 – Providing Member States with guidance and support in dialogue on the management of textile waste between actors involved	+	+	+/-	Net positive but limited
Option 2 – Proposing additional measures to align waste management to the waste hierarchy				
Measure 2.5 – Setting sorting obligations for separately collected textiles and textiles waste	-	+	+/-	Net positive
Measure 2.6 – Adopting end of waste criteria	-	+	+	Net positive
Measure 2.8 – Setting requirements for the shipments of textiles	-	+	+/-	Net positive
Measure 2.9 – Mandating the use of EPR	+/-	+	+/-	Net positive
Measure 2.14 – Setting reporting obligations for textiles	-	+	NA	Net positive
Option 3 – Prescribing targets and restrictions				
Measure 3.1 – Setting an EU textile reduction target	+/-	+	+/-	Likely net positive
Measure 3.4 – Setting a preparation for reuse target for textiles	+/-	+	+/-	Likely net positive
Measure 3.5 - Setting a reuse target for textiles	+/-	+	+/-	Likely net positive
Measure 3.6 - Setting a separate collection target for textiles waste	+/-	+	+/-	Likely net positive
Measure 3.8 – Setting a recycling target for textiles	+/-	+	+/-	Likely net positive

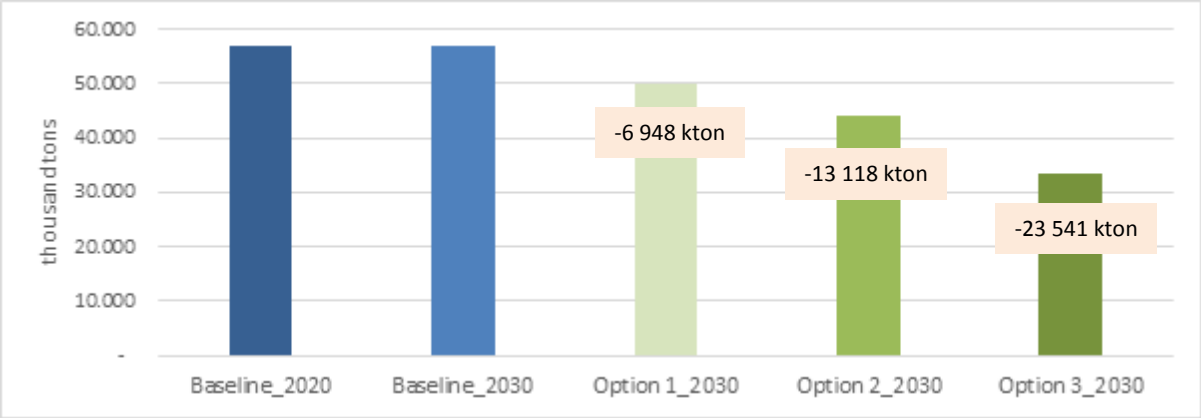
2. Food waste[147]

This Annex presents results of the MAGNET model and other analysis for the options setting legally binding food waste reduction targets (Option 1 to Option 3). As regards Option 4, it is not possible to assign specific reduction level (but only a range of reduction), therefore the MAGNET model was not run for this option and therefore not included in this Annex. As the impacts for Option 4 are expected to be in the range between the Baseline (2030) and Option 1, its impacts are described (in the main document) by reference to impacts from these options.

2.1. Impact of reduction scenarios on food waste quantities

The reduction of food waste increases with a broader coverage of the food supply chain and increased target levels. Figure 1 depicts the baseline food waste numbers in 2020 and 2030 and compares it with the three main scenarios: Option 1, Option 2 and Option 3. Option 1 leads to an estimated reduction of food waste of around 7 000 ktons, while the expected food waste reductions are around 13 000 ktons for Option 2 and around 23 500 ktons for Option 3.

Figure 1 – Total EU27 food waste quantities in the baselines and the three options



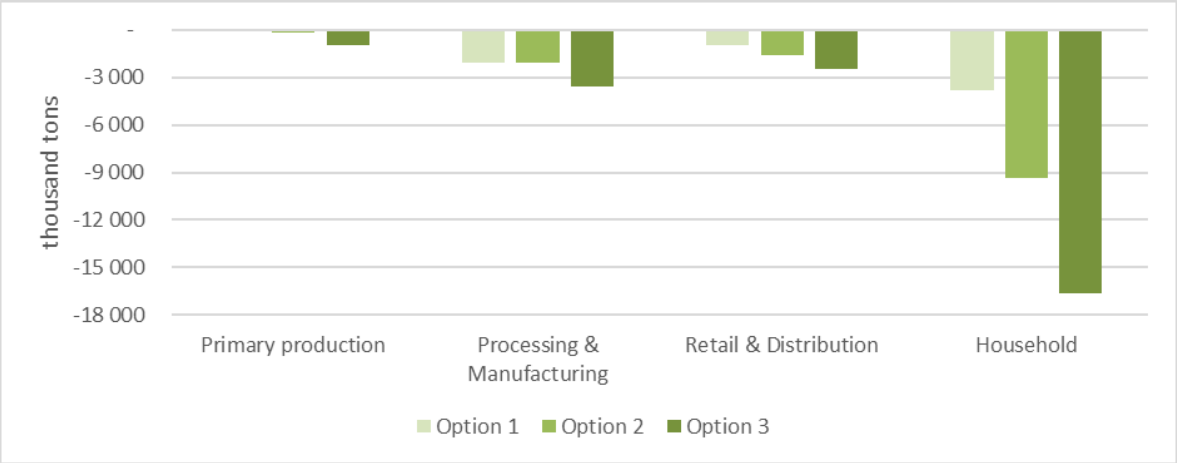
Source: MAGNET simulation results (2020 baseline based on ESTAT 2022)

The ambitious food waste reduction in Option 3 can be traced back to the high reduction target rates (50%) at the household level as most food waste occurs at this stage. On the other hand, an increased reduction of food waste in the other main segments of the food supply chain under all three options, has more limited impact compared to the consumption segment (Figure 2). This is due to the smaller share of total food waste attributed to upstream stages of the food supply chain. For instance, Option 3 leads to an estimated food waste reduction of nearly 17 000 ktons at the household level, while the expected decrease at the retail and distribution level only amounts to 2 400 ktons of food waste.

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[147] This assessment is based on: De Jong B, Boysen-Urban K, De Laurentiis V, Philippidis G, Bartelings H, Mancini L, Biganzoli F, Sanyé Mengual E, Sala S, Lasarte-López J, Rokicki B, M'barek R. *Assessing the economic, social and environmental impacts of food waste reduction targets. A model-based analysis.* Publications Office of the European Union, Luxembourg, 2023, doi:10.2760/77251, JRC133971.

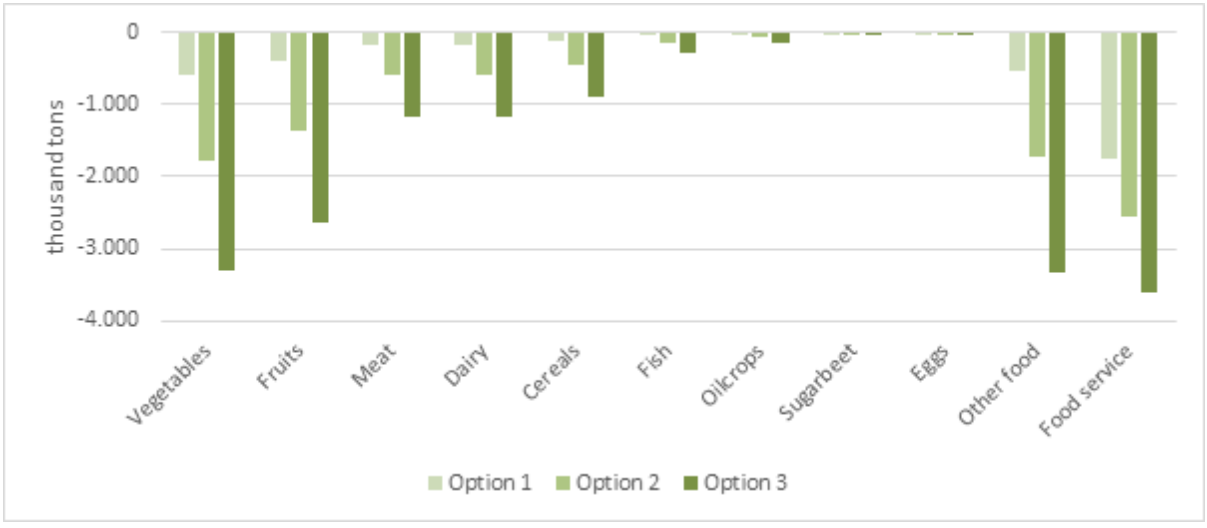
Figure 2 – Deviations in EU27 food waste quantities at the industry and consumption stage, Options vs baseline 2030



Source: MAGNET simulation results

Per food commodity group, the largest food waste reductions are expected to happen in sectors where food waste generation is the highest. Vegetables and fruits constitute over 40% of food waste by households with the result that household waste reductions fall commensurately in these sectors. Hence, Option 3 results in food waste reduction by more than 3 000 ktons for vegetables and more than 2 500 ktons for fruits (Figure 3). Households' out-of-home consumption of food waste is depicted by the food service sector as a whole, and the food waste reductions at this level is also significant (over 3 500 ktons in Option 3). Other food sector comprises mostly packaged and prepared food, where noteworthy reductions are also expected.

Figure 3 – Change deviations in household food waste quantities per commodity group for EU27 options vs baseline 2030



Source: MAGNET simulation results

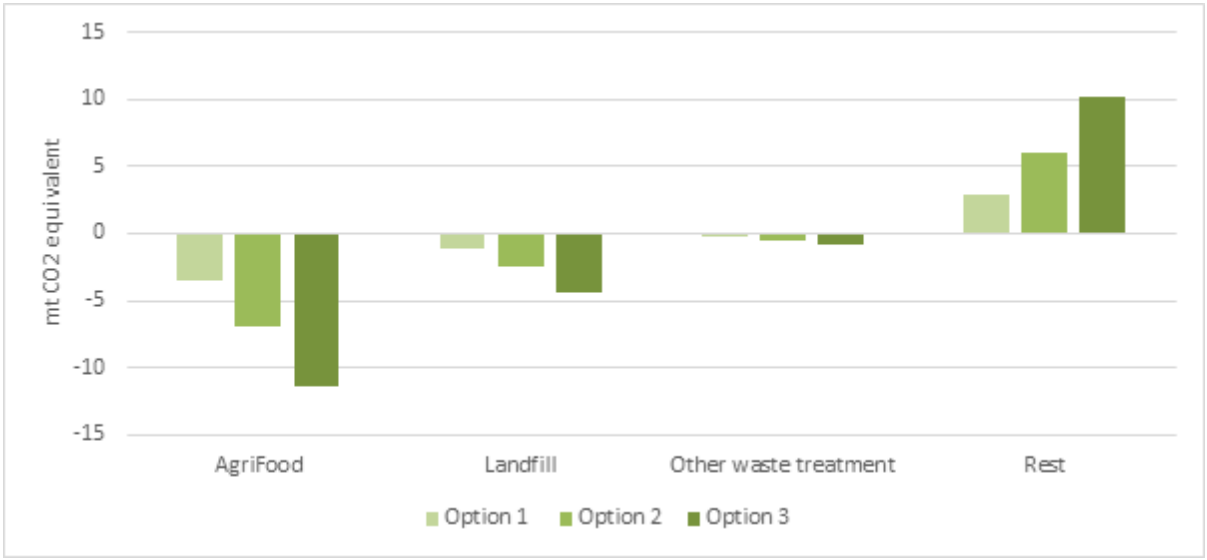
2.2. Environmental impacts

2.2.1. MAGNET model

2.2.1.1. Emissions

The results show that savings in amounts of food waste at any stage of food supply chain have a significant positive environmental impact on emissions both within the EU and globally. As explained in the methodological chapters, it is assumed that reduced household food expenditures result in rising non-food expenditures (savings rates are assumed fixed across all options) such that there is an increase in emissions from other economic activities (Figure 4).

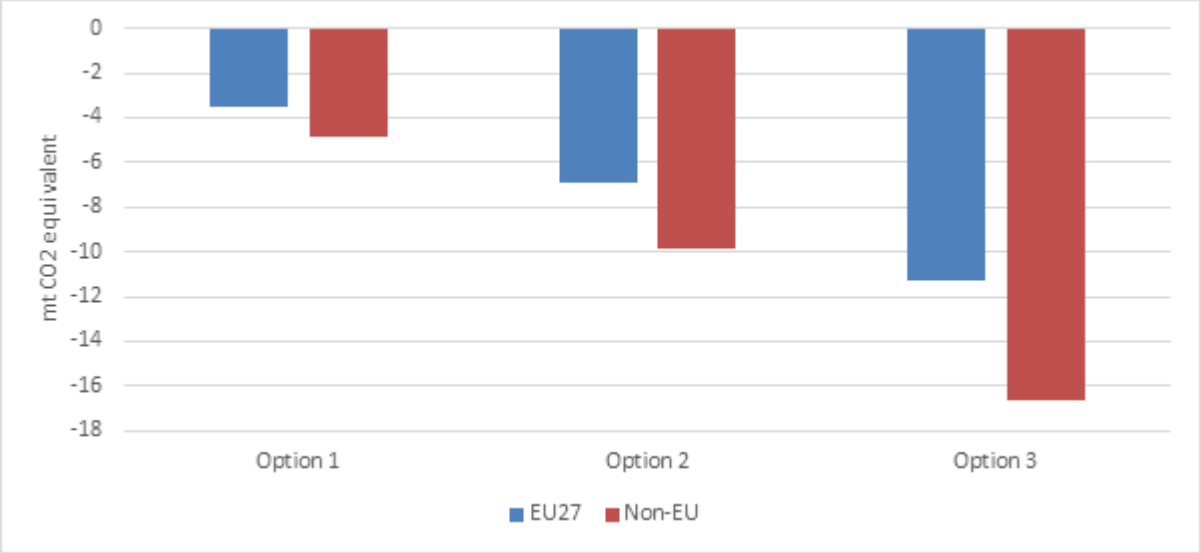
Figure 4 – Absolute deviation of direct emissions in the EU27 (mt CO2 equivalent) options vs baseline 2030



Source: MAGNET simulation results

Figure 5 depicts absolute deviations of direct emissions associated with agri-food for the EU and non-EU. In connection with food waste reduction in the EU, a decrease in direct emissions in the rest of the world is also expected, resulting from the EU's reduced agri-food import demand in particular.

Figure 5–Absolute deviation of direct emissions associated with agri-food (mt CO2 equivalent) options vs baseline 2030



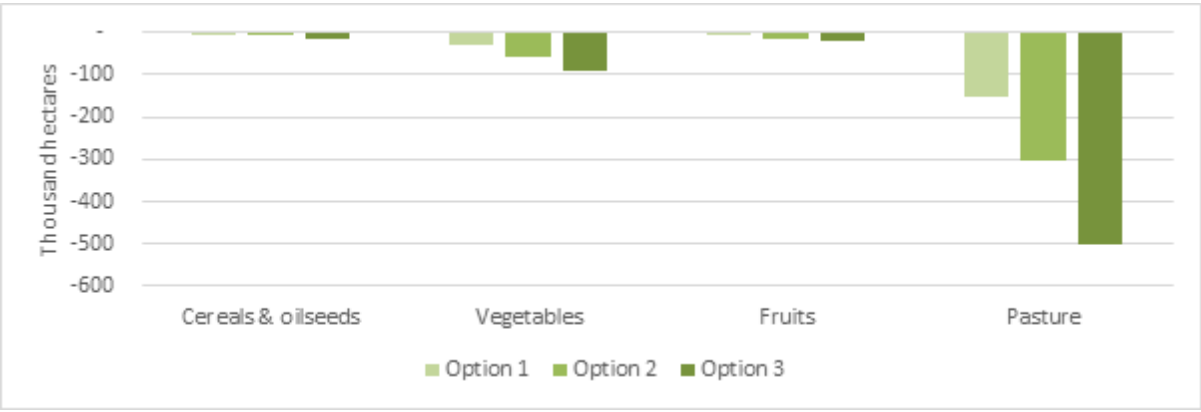
Source: MAGNET simulation results

It should be noted that the modelling does not take into account other policy constraints, such as the national greenhouse gas emissions reduction targets established in the EU. In reality the rebound effect may actually translate in the need to take less measures in other sectors to achieve the agreed GHG reduction targets, reducing overall mitigation costs in the economy with the same environmental effect

2.2.1.2. Land use

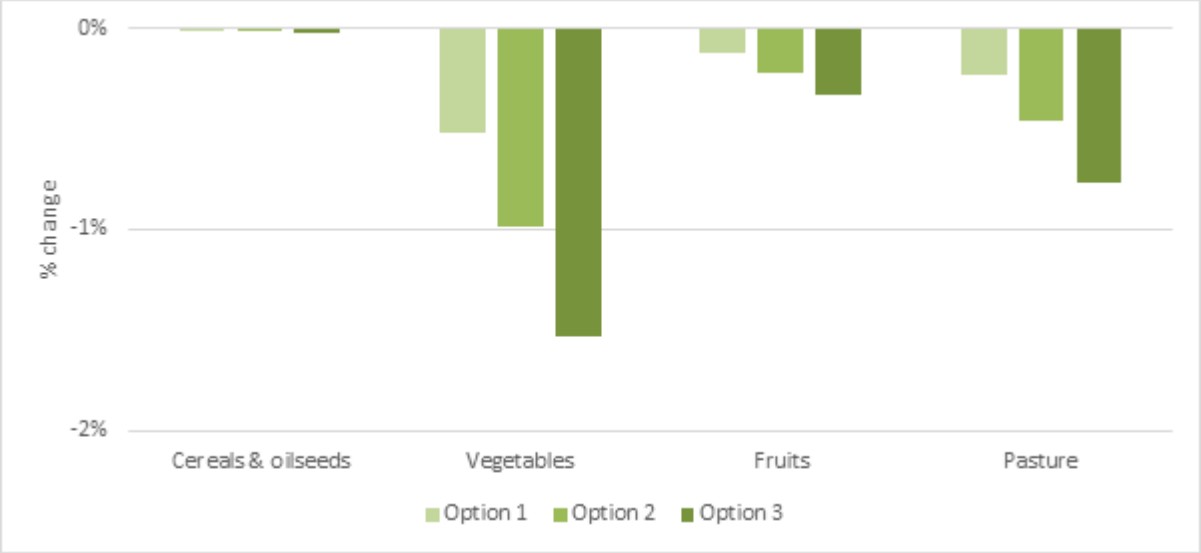
Food waste reduction options in general lead to slight decreases in land use driven by changes in demand and production. The highest decrease (by hectare) is expected to occur in pastureland, with a decrease of 500 000 hectares in Option 3 (Figure 6). However, this e only corresponds a decrease of up to 0.77% (Figure 7). Although limited, the highest percentage change in land demand is expected in the vegetables sector as a result of decreasing demand and production in this sector.

Figure 6: Absolute deviation in land use in the EU (thousand hectares) options vs baseline 2030



Source: MAGNET simulation results

Figure 7: Deviation in land use in the EU (% change) options vs baseline 2030 (baseline in 2020 =100)



Source: MAGNET simulation results

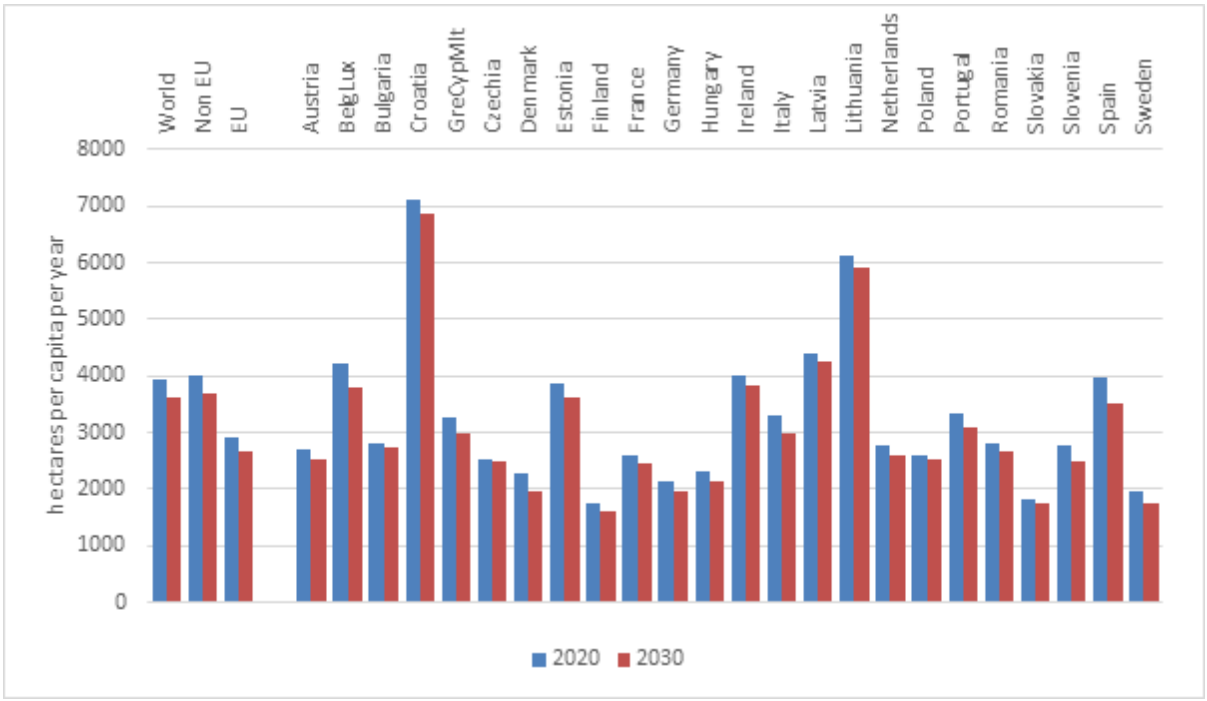
2.2.1.3. Footprints (consumption, households)

This section shows the environmental impacts of different food waste reduction targets using household food demand-driven footprints of land, emissions and energy, which measure the intensity of land use (i.e., emission and energy use associated with food consumption).

Figure 8, Figure 10 and Figure 12 show the development of the land (m^2), emission (kg CO2 equivalents) and energy footprints (mega joules, MJ) per capita per year in the baseline for the years 2020 and 2030. Whereas, Figure 95, Figure 11 and Figure 13 show the land, emission and energy savings due to the reduction of waste by comparing the footprints of the scenarios with the footprints in the baseline in 2030.

While the land footprint of the EU27 is already lower than world average in 2020, Figure 8 shows that the land footprint across Member States significantly differs but decreases for all Member States from 2020 to 2030.

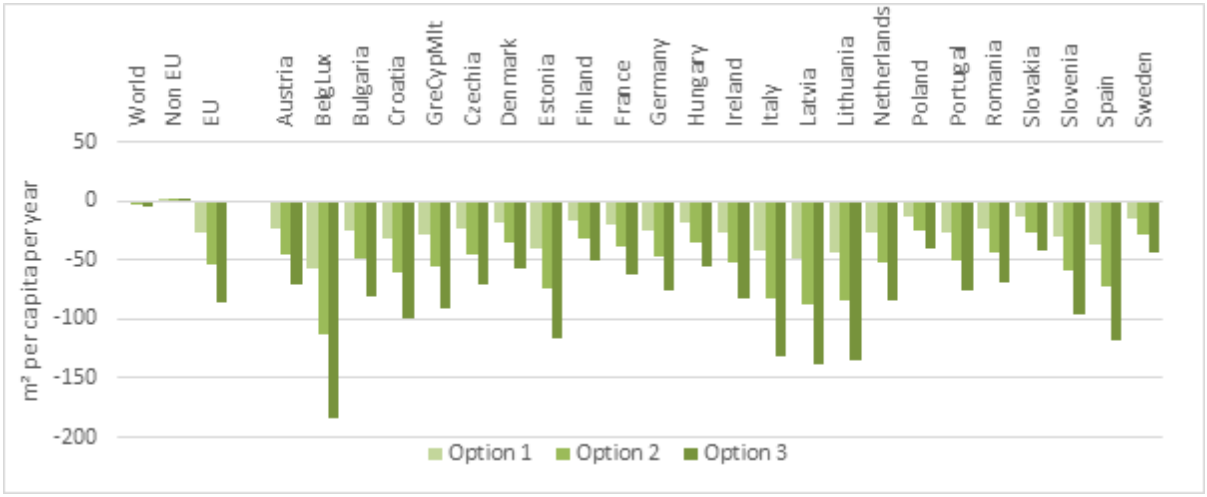
Figure 8: Land footprint associated with household food consumption (m^2 per capita per year) – baseline 2020 and 2030



Source: MAGNET simulation results

Food waste reduction in the EU leads to a reduction of the land footprint associated with household food consumptions of the EU and of all Member States, while it leads to an increase of the land footprint in non-EU regions. As the impact on the non-EU region is very small, the world land footprint tends to decrease in 2030 compared to the baseline. The magnitude of these land use savings increases with an increase in the food waste reduction targets, thus scenario Option 1 leads to the smallest savings, while scenario Option 3 leads to the highest savings. The extent of these savings largely differs across Member States- between 2% and 5% in Option 3.

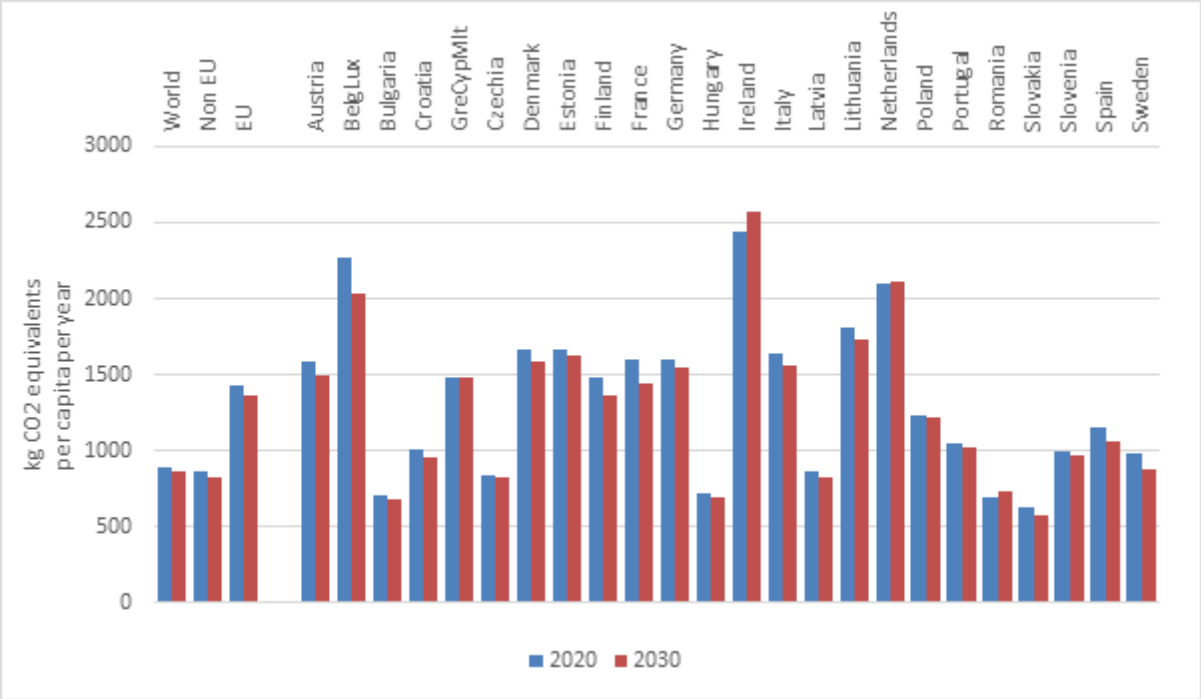
Figure 9: Land footprint associated with household food consumption (m² per capita per year) – savings, options vs baseline 2030



Source: MAGNET simulation results

By contrast to the land footprint, the emission footprint of the EU is higher than the world average in the baseline in 2020. Figure 10 also shows significant differences across Member States. While the emission footprint of the EU decreases from 2020 to 2030, the development of the Member States' footprints is mixed. The emission footprint tends to decrease less in the EU-13 Member States[148] and even increases in Member States that showed the highest footprints in 2020.

Figure 10: Emission footprint associated with household food consumption (kg CO2 equivalent per capita per year) –baseline 2020 and 2030

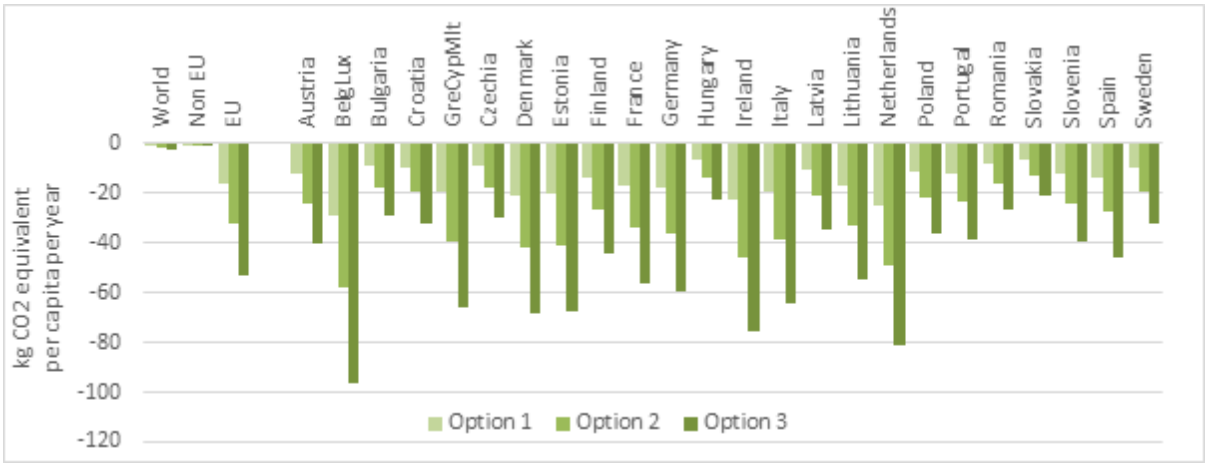


Source: MAGNET simulation results

In line with the findings related to the land footprint, the emission footprint of the EU and of all Member States also decreases when reducing food waste, with the highest effects observed in the scenario "Option 3". However, the extent largely differs across Member States and varies between around 3% to 5% in emission savings.

Figure 11: Emission footprint associated with household food consumption (kg CO2 equivalent per capita per year) – savings per options vs baseline 2030

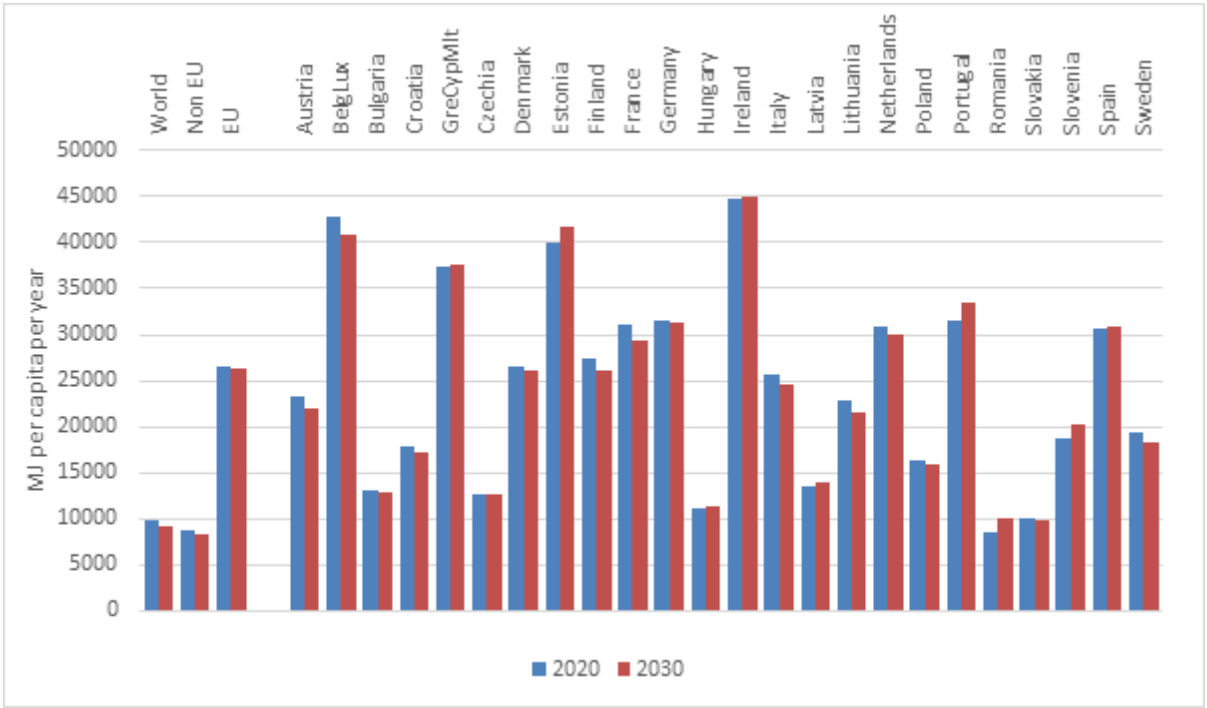
[148] Bulgaria, Croatia, Cyprus, Czechia, Estonia, Hungary, Latvia, Lithuania, Malta, Poland, Romania, Slovakia and Slovenia



Source: MAGNET simulation results

Also, the energy footprint of the EU is higher than the world average in the baseline in 2020 and Figure 12 shows significant differences across Member States. While the energy footprint of the EU decreases only minimally from 2020 to 2030, the development of the Member States' footprints is mixed. The energy footprint tends to increase or remain unchanged in many EU Member States; only very few Member States show a decrease in their footprint.

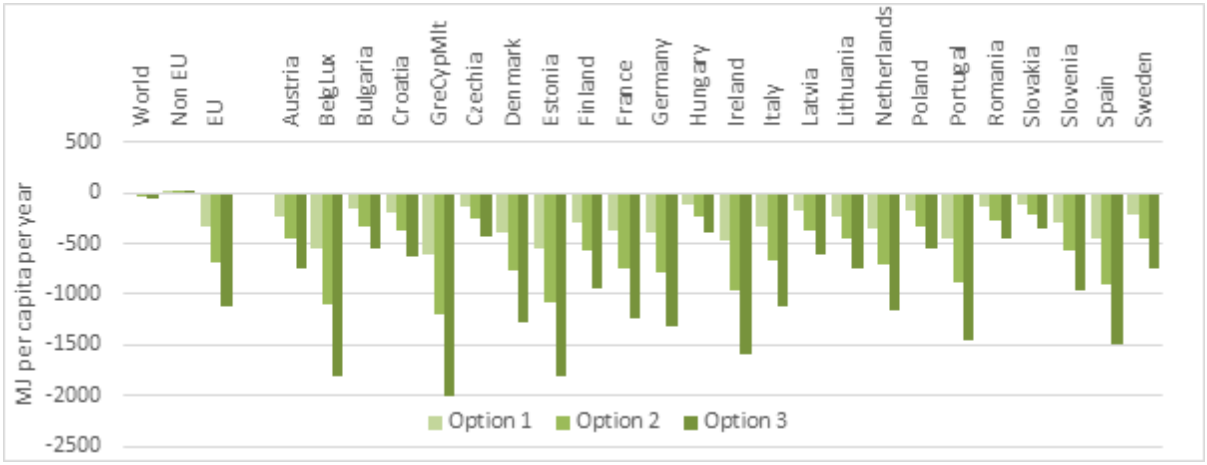
Figure 12: Energy footprint associated with household food consumption (MJ per capita per year) – baseline 2020 and 2030



Source: MAGNET simulation results

Figure 13 shows that food waste reduction leads to savings with regard to energy use in household food consumption, with the highest reduction of the energy footprint observed in "Option 3". Member States save around 3-5% of energy related to household food consumption in the most ambitious scenario.

Figure 13: Energy footprint associated with household food consumption (MJ per capita per year) – savings per options vs baseline 2030



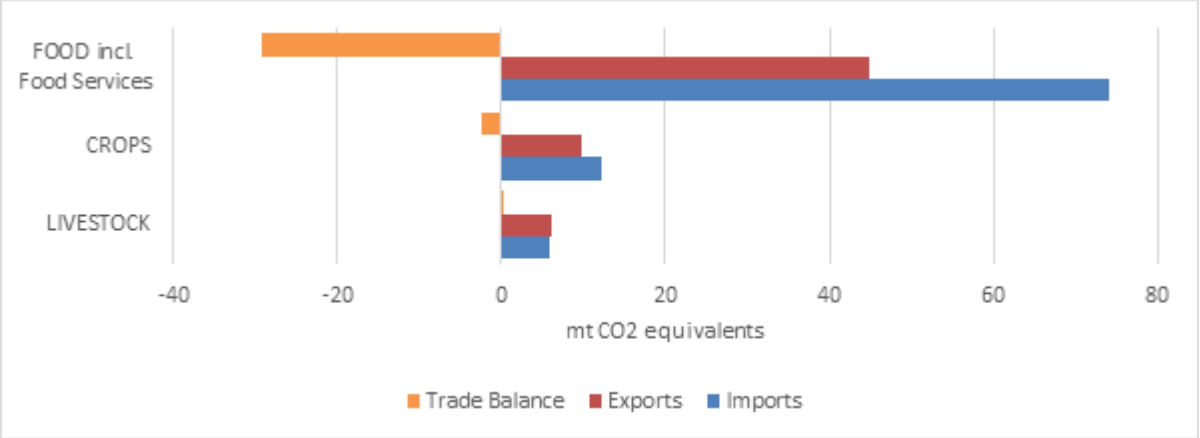
Source: MAGNET simulation results

2.2.1.4. Virtual trade – systemic view

The footprints presented in the previous section consider emissions and land use associated with household food consumption in the EU, hence accounting for the quantity of the virtual (i.e., non-tradable) commodity embedded within imported and domestic EU final food consumption. The underlying virtual flows and their concomitant cross-boundary trade impacts are presented in the figures below.

Figure 14 shows that the EU is a net-emission importing region that is represented by the negative trade balances for both livestock and food. In other words, EU consumers generate emissions 'leakage' through their food consumption patterns. However, the negative trade balance for food is much larger than for livestock. Virtual emission trade related to food is in general larger than for crops and livestock, particularly as livestock is not traded much and all meat and dairy trade is included in food. In addition, virtual emission trade related to food is unbalanced as virtual exports only account for around two thirds of virtual imports, while virtual emission trade related to crops is rather balanced.

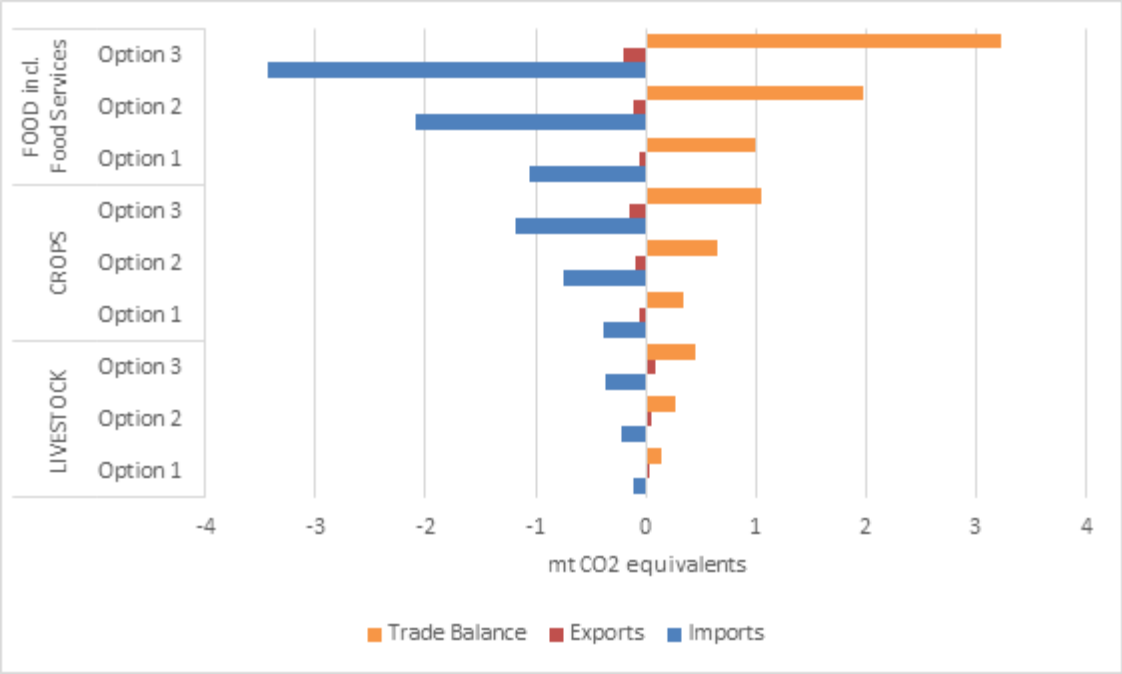
Figure 14: EU virtual emission trade flows (mt CO2 equivalents) in the baseline 2030



Source: MAGNET simulation results

Reductions in food waste lead to reductions in virtual emissions imports and exports associated with livestock and food trade. The extent to which virtual emissions imports are reduced significantly outweighs the impact on virtual emissions exports, so that the virtual emissions trade balance improves. Virtual emission exports associated with trade in crops tend to increase while virtual imports decrease, hence also improving the virtual emission trade balance. However, the impact of the reduction in food waste on virtual emissions trade is rather small so that the net position as a net emissions import region tends to improve only slightly. The more ambitious the food waste reduction target, the larger the effect is on the trade balance (Figure 15).

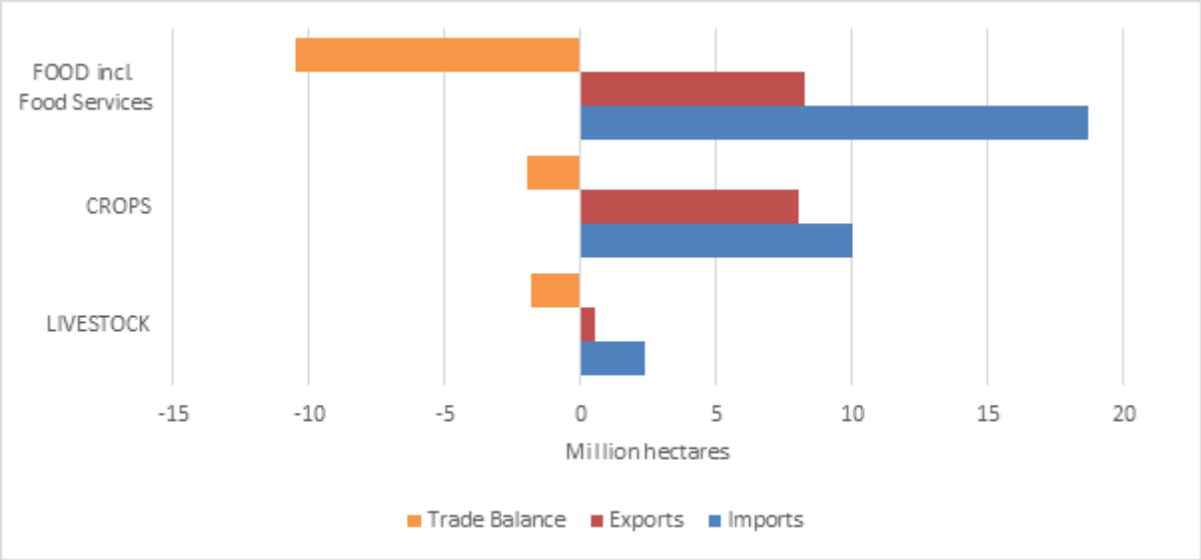
Figure 15: Absolute deviation of EU virtual emission trade flows (mt CO2 equivalents) options vs baseline 2030



Source: MAGNET simulation results

Figure 16 shows that the EU is a net-importing region with regard to the virtual trade of land, with the largest negative trade balance associated with the trade of food and food services.

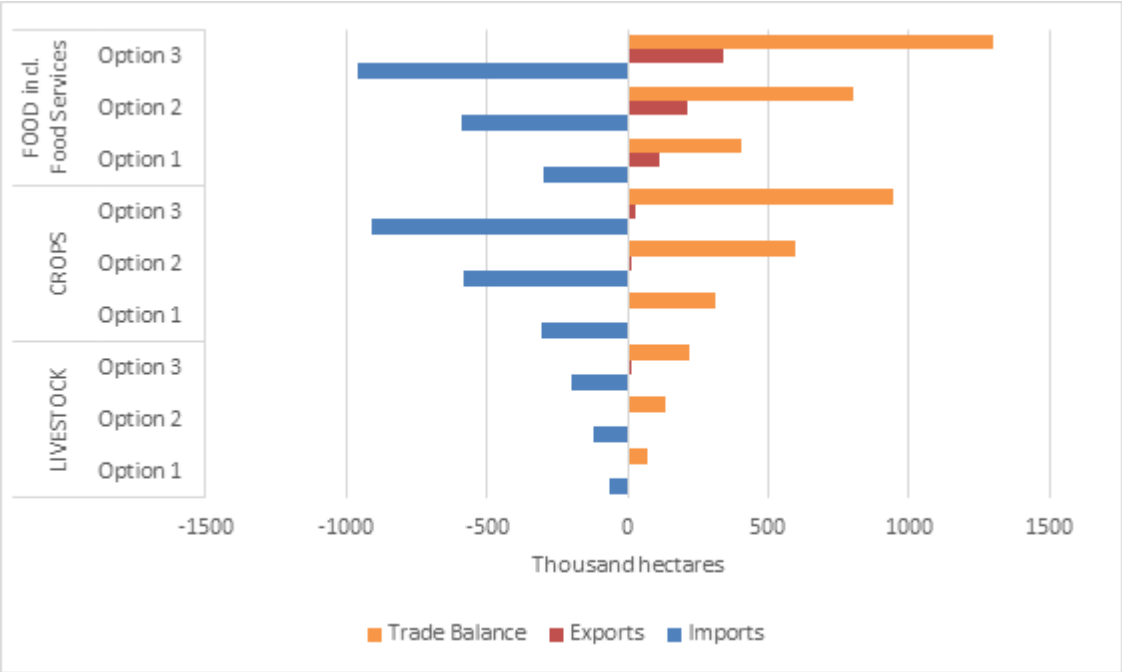
Figure 16: EU virtual land trade flows (million hectares) in the baseline 2030



Source: MAGNET simulation results

The virtual land trade balance also improves with the reduction of food waste, revealing the smallest changes with regard to crops followed by livestock and food. By contrast to virtual emission trade, virtual exports of land tend to increase for all commodity groups, while virtual land imports tend to decrease. As the effect on virtual land imports clearly outweighs the effect on virtual land imports, the virtual land trade balance improves for all three commodity aggregates. Figure 17 also supports the previous statement that the more ambitious the food waste reduction target, the larger are the effects on virtual land trade.

Figure 17: Absolute deviation of EU virtual land trade flows (thousand hectares) options vs baseline 2030



Source: MAGNET simulation results

2.2.2. Bottom-up analysis

This chapter presents the results of a complementary modelling approach that was applied to the analysis of food waste prevention targets in order to support the policy impact assessment. The approach relies on the application of the Life Cycle Assessment (LCA) method, which allows assessing the environmental impacts of food and food waste by modelling individual food products in their entire life cycle (from agriculture production to food waste management). In this way the environmental benefits deriving from the application of food waste reduction targets are estimated, based on the quantities of food waste avoided in the different policy options and on the environmental impacts of representative food products of the modelled food groups assessed in the Consumption Footprint, (EC - European Commission, 2022; Sala and Sanye Mengual, 2022). Details of the methodology are provided in Annex 4.

Table 37 shows the environmental impacts caused by food waste generation in the baseline, while the avoided environmental impacts (and relative monetised values) for the EU27 obtained as a consequence of food waste reduction targets set in the three policy options are displayed in Table 38 and Figure 18 for four selected environmental impact categories.

Table 37- Environmental impacts of food waste in the baseline used for the impact assessment

Impact category	Climate change	Land use[149]	Marine eutrophication	Water use[150]
Unit	MtCO2eq.	Trillion Pt	Million kg N eq.	Billion m3 water eq.
Baseline 2030	244	8.4	2069	332

Table 38 - Overview of results on environmental savings associated to the policy options and their equivalent estimated monetary values

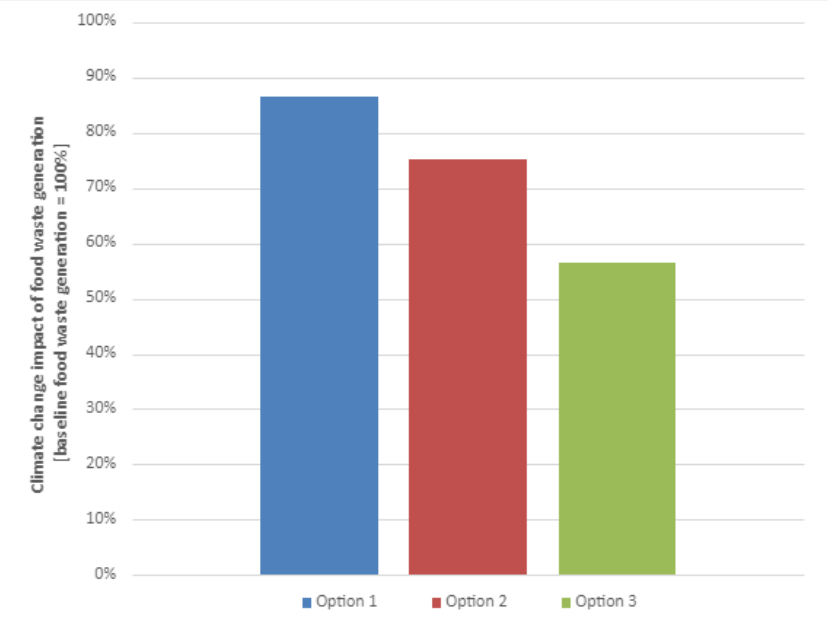
Impact category	Climate change	Land use	Marine eutrophication	Water scarcity	Overall environmental savings monetised
Unit	MtCO2eq.	Trillion Pt	Million kg N eq.	Billion m3 water eq.	Billion Euros
Main scenarios					
Option 1	-33.1	-1.16	-283	-43	5-12
Option 2	-62.0	-2.16	-532	-80	9-23
Option 3	-107.8	-3.75	-922	-141	15-40

Figure 18 shows the relative reductions for the impact on climate change achieved with the three policy options. Similar results can be observed for the other impact categories.

149 Impact of land use on soil assessed considering impacts on four soil properties: biotic production, erosion resistance, groundwater regeneration and mechanical filtration

150 A m3-world eq. represents a cubic meter consumed on average in the world. The average refers to a consumption-weighted average, and hence represents the locations where water is currently consumed

Figure 18: Relative differences in climate change impact between the three policy options.



Considering the various steps of the supply chain, Figure 19 shows the contribution of primary production, processing and manufacturing, retail and distribution and consumption phases in the reduction of climate change impact under the three policy options. The consumption phase has a major role in the overall avoided impact, due to the fact that the largest share of food waste is generated at this stage, and that, in a life cycle perspective, the products reaching the consumer have higher impacts than earlier in the supply chain as the impacts cumulate along the supply chain.

Figure 19: Avoided climate change impact obtained with the three policy options considering the various steps of the supply chain.

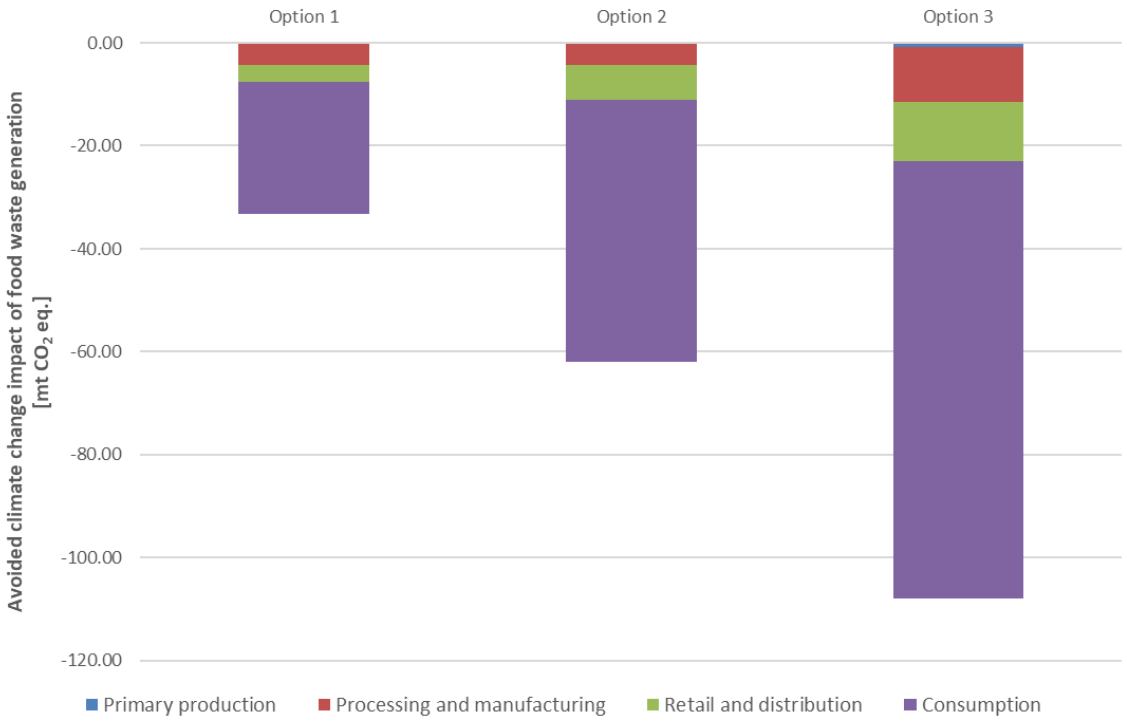


Figure 20 and Figure 21 show the contribution of avoided waste treatment and avoided food production in the total environmental savings that can be achieved applying the various policy options. Avoided food production plays a bigger role for all the impact categories but, in the case of climate change, the contribution of waste treatment is slightly higher than for the other impact categories.

Figure 20: Avoided climate change impact due to food production and waste treatment in the three policy options

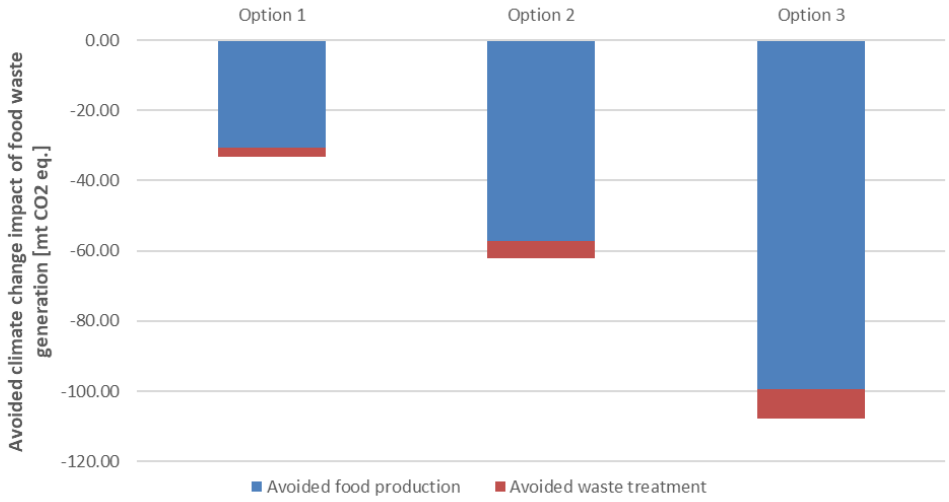
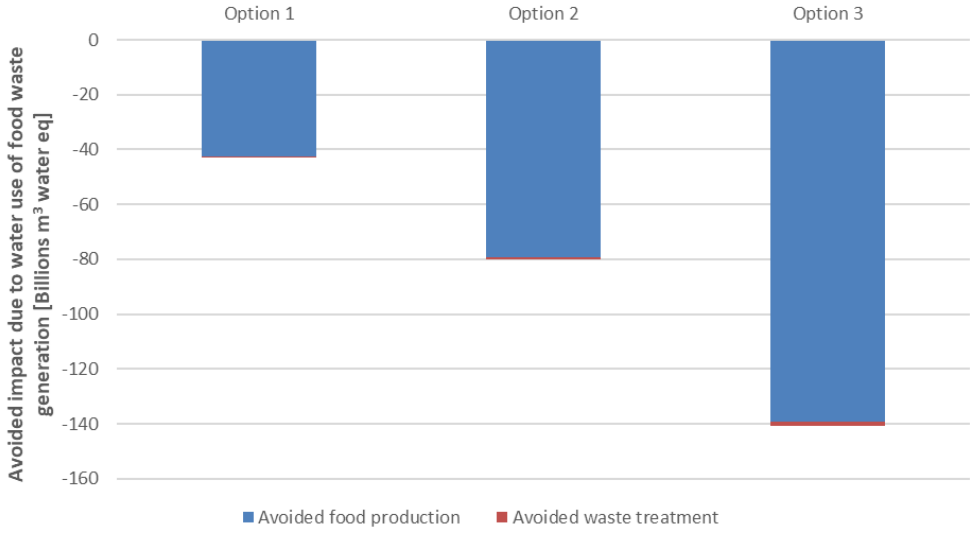
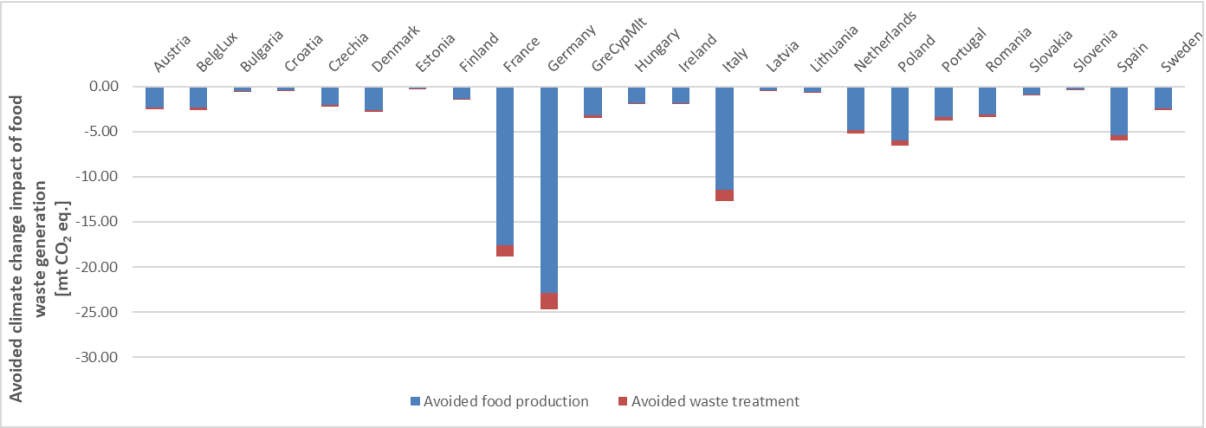


Figure 21: Avoided impact on water use due to food production and waste treatment in the various policy option



The climate change impacts avoided in each Member State under the third policy option are shown in Figure 22. The highest impacts are in Germany, France and Italy, which are also the countries with the biggest amounts of food waste and biggest population.

Figure 22: Avoided climate change impact in the Member States with option 3



2.2.3. Comparison of the two approaches

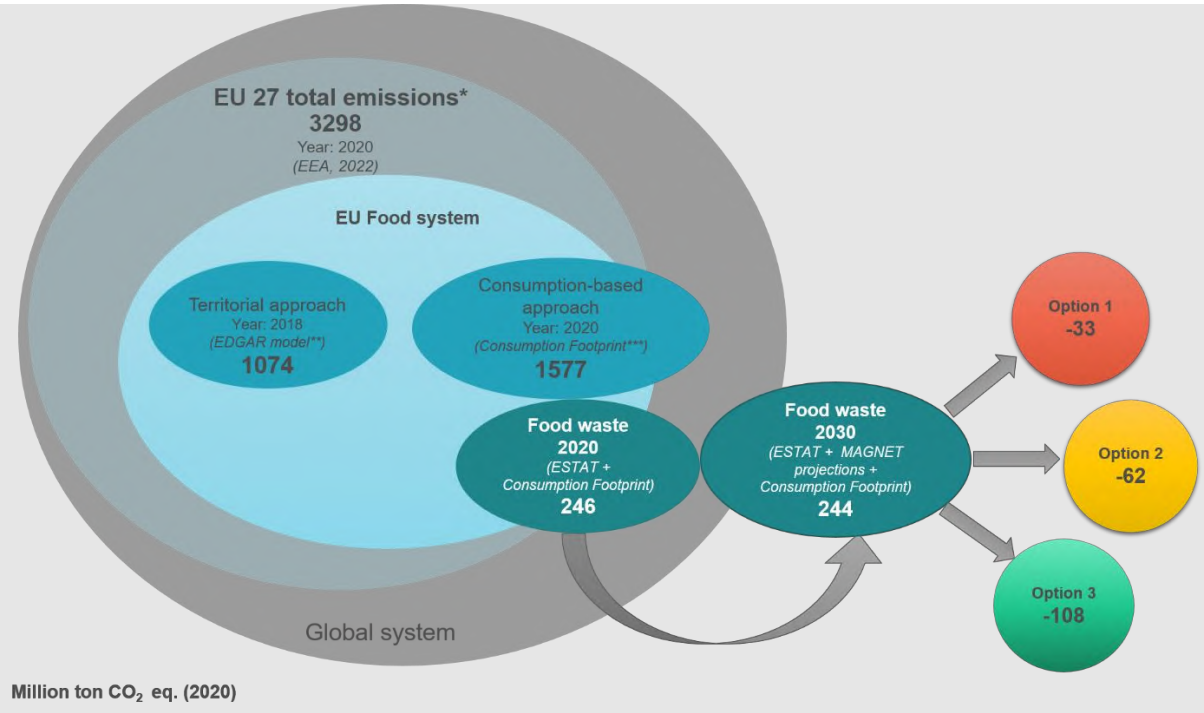
Environmental impacts presented in this section are calculated with two different approaches: the MAGNET model (section 4), providing impacts in terms of emissions and land use, and the bottom-up analysis (Section 5), which uses the metrics proposed by the Environmental Footprint method (EC - European Commission, 2021). The common metric used by both approaches are greenhouse gas emissions (expressed as $kgCO_2eq$) and therefore a comparison between the two approaches could be performed for this impact category.

Differences between the two approaches are significant and reflect the different methodological basis. In the case of the bottom-up approach, the avoided environmental impacts are calculated considering that a reduction of food waste brings benefits linked to: (i) the avoided impact of producing and distributing the food items saved up to the point of the FSC where the food waste is avoided and (ii) the avoided impact of the food waste disposal following the approach presented in (De Laurentiis et al., 2020). The assessment is entirely based on biophysical flows and assumes a linear relation between the amount of reduced food waste and reduced environmental impacts.

Figure 23 shows the potential climate change reductions due to food waste reduction targets assessed with the bottom-up approach in the context of the overall climate change impact due to the EU-27 economy (3298 Mt CO2 eq.), as reported by EEA (2020). The contribution of the EU food system is estimated as one third of the total when considering a production-based emissions (territorial approach) (Crippa et al., 2021). This share is higher when considering the emissions embodied in the imported goods with the Consumption Footprint (CF) approach (around a half of the total), which estimates the impact of food consumption as 1577 Mt CO2 eq. Climate change impact of food waste in 2020 (based on reported food waste quantities, ESTAT (2022) is quantified as 246 Mt CO2 eq. (16% of the impact of food systems) and 244 Mt CO2 eq. in 2030 (based on projections of food waste derived applying the production changes used in MAGNET). The emissions reductions obtained with the three policy options range between 33 and 108 Mt CO2 eq. These values do not include possible rebound effects, which are instead captured in MAGNET and that seem to contribute substantially to offsetting the environmental benefits of these policy measures.

Figure 23:

Reductions in climate change impact due to the application of food waste targets, in the context of the global impact of the EU 27 system and the impact due to food systems. All amounts are million tonnes of CO_2 eq.



Notes. (*) excluding Land Use, Land Use Change and Forestry (LULUCF) and international aviation and international maritime transport (EEA, 2022); (**) EDGAR is the Emissions Database for Global Atmospheric Research developed by the JRC[151] (Crippa et al., 2021); (***) The Consumption Footprint (CF) approach is based on the calculation of impact at product level and considering the full life cycle of products[152] (Sanyé-Mengual and Sala, 2023).

Source: Author's own elaboration based on data from (EEA (2022), Crippa et al., (2021), Sanyé-Mengual and Sala (2023), ESTAT (2022), bottom-up approach

In the case of the MAGNET model, the emissions reductions are calculated within an (economic) general equilibrium model approach which takes into account market dynamics and interrelations between different economic sectors., Similar to the results of the bottom-up analysis, though based on different assumptions, food waste reductions at all stages of the food supply chain have a significant positive environmental impact on emission savings, both within the EU and globally.

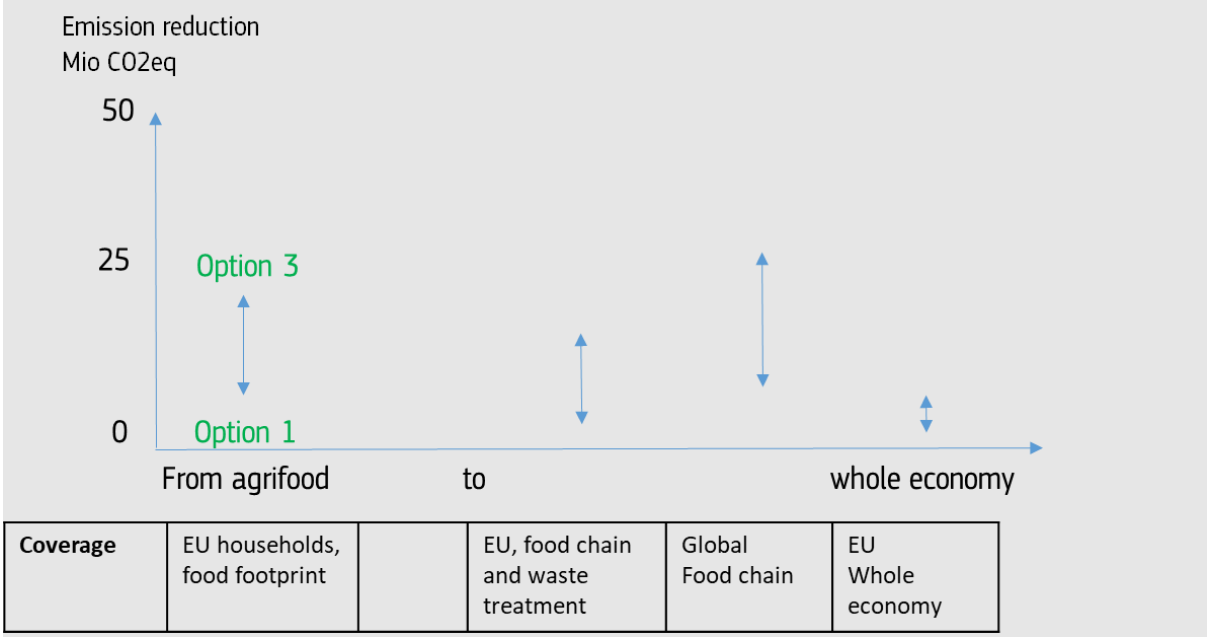
The so-called rebound effect arises when reduced household food expenditures result in rising non-food expenditures (savings rates are assumed fixed across all scenarios) such that there is an increase in emissions from other non-food economic activities. As shown, the larger is the final demand redistribution effect resulting from higher household waste reductions, then the larger is the rise in emissions in non-food and waste management/treatment activities.

[151] https://edgar.jrc.ec.europa.eu/
[152] https://eplca.jrc.ec.europa.eu/sustainableConsumption.html

Therefore, depending on the spatial and sectorial coverage as well as calculation method, results are diverging (see sections 4.3.4.1 and 4.3.4.3).

Figure 80 shows the range of emission reductions in the scenarios (from Option 1 to Option 3). On the left-hand side, the reductions of the aggregated emission footprint associated with household food consumption for the EU are depicted (in Mio CO2eq Option 1: -7.4, Option 2: -14.6, Option 3: -24.1). Looking at the right-hand side, the emissions are presented as reductions in the EU food chain including the waste treatment (-4.9, -9.8, -16.7), including the global food chain (-8.3, -16.7, -28.0) and, finally, the EU whole economy including rebound effects (-2.0, -3.9, -6.5). It should be noted that there is a high uncertainty related to the assumptions regarding the waste treatment (e.g. share of food waste in landfill etc.).

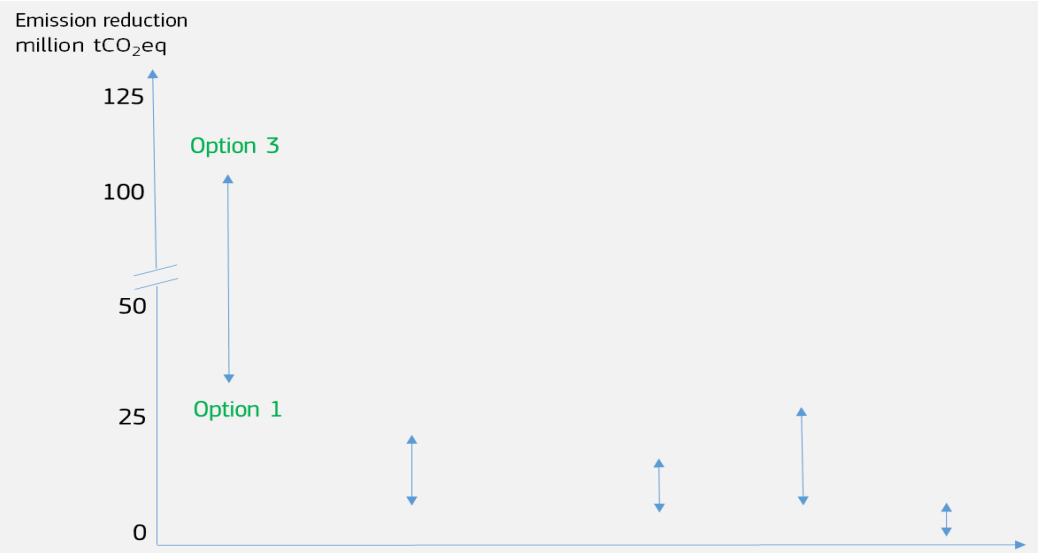
Figure 24: Overview of different emission calculations within MAGNET range of reduction in Mio CO2eq from Option 1 to Option 3



Source: MAGNET simulation results

Figure 25 presents a comparison of the bottom-up analysis and the general equilibrium model with regard to the resulting emission savings. Apart from different assumptions on the estimated emissions per ton of food commodity, the choice of a linear (maximum benefit through full substitution of market commodity) or non-linear (considering rebound effects) approach as well as the spatial and sectorial coverage explain the differences.

Figure 25: Overview of different emission calculations by Consumption Footprint (life cycle assessment based) and within MAGNET range of reduction in Mio CO2eq from Option 1 to Option 3



Coverage	EU, Food chain and avoided waste treatment	EU households, food footprint		EU, food chain and waste treatment	Global Food chain	EU Whole economy
Model	Consumption Footprint (bottom-up approach)	MAGNET		MAGNET	MAGNET	MAGNET

Source: MAGNET simulation and bottom-up approach results

2.3. Economic impacts

This section assesses the impact of the selected policy options on economic variables such as changes in consumer demand, agricultural production and market prices and the impact on international trade. The aim is to show how the reduction of food waste affects different markets along the supply chain and to highlight the impact of possible direct and indirect rebound effects through the interlinkages of different markets. This section concludes with an economic cost-benefit analysis focusing on the costs associated food waste reduction and the resulting impact on GDP and welfare.

This study simulates the targeted consumer food waste reductions by increasing the cost of generating waste and accounting for both price and quantity effects associated with a reduction in food waste as outlined in earlier. In doing so 50%, 30% and 15% respectively of the initial food waste is recovered as food for human consumption. In addition, food waste reduction at retail, processing, and primary production stages affects output and market prices. Reducing food waste increases cost of waste generation relatively to the price for food commodities. As a result, the waste rate will fall as more food commodities are purchased when looking at relative prices; however, in addition some of the initially demanded food commodities will be recovered for food production. Thus, agricultural and food production could be produced by demanding fewer food commodity inputs. However, by how much this translates into lower market prices for agri-food commodities depends on the cost associated with food waste reduction.

Regarding the latter, on the production side, for each leverage point in the food supply chain, the costs for food waste reduction represent an internalisation of a market failure (which is food waste). The additional cost (represented by a tax) proxies for the adjustment costs (i.e.,

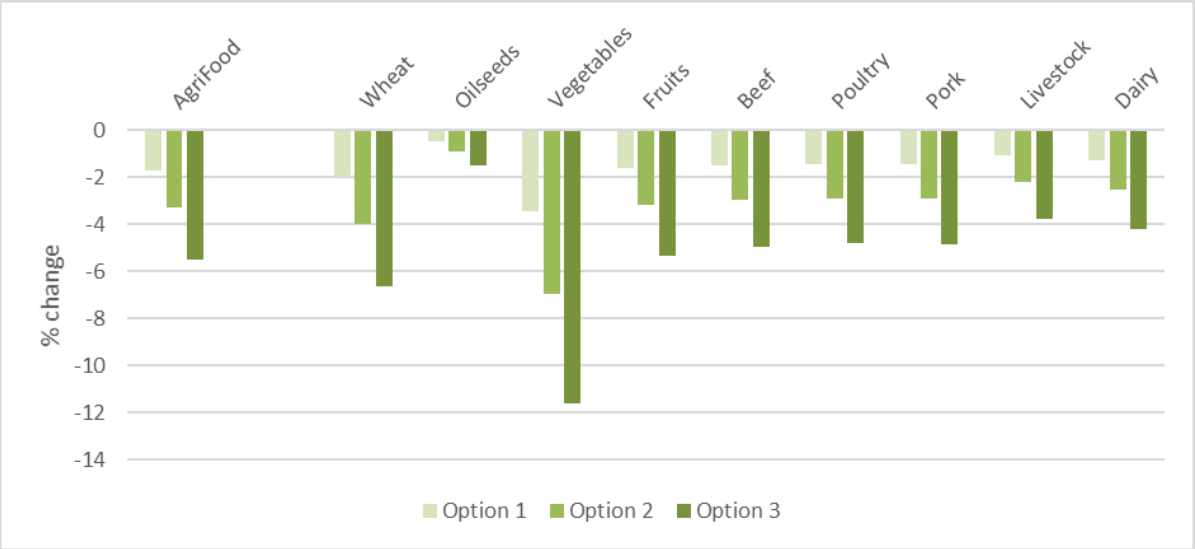
improvements in harvesting, labelling, storage, distribution) that inevitably result from (partly) removing these supply chain inefficiencies.

On the demand side, the slightly rising cost per unit of food consumption to the consumer is a market signal that reflects the behavioural adjustment required to reduce food waste (increased planning and preparation times, and/or market signals to incentivise food consumption behaviour). It should be noted, however, that market prices still fall because aggregate demands for food fall (quantity effect), which outweighs the rising per unit cost effect noted above

2.3.1. Demand impacts

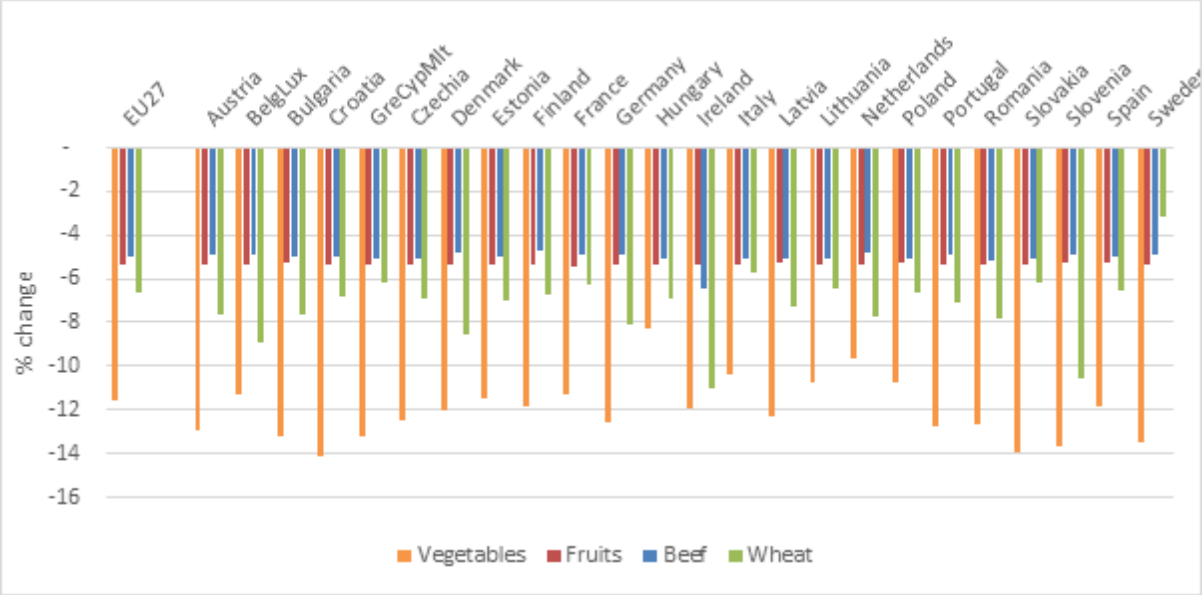
Figure 26 shows the changes in consumer demand in the three policy options compared to the baseline in 2030 for selected commodities. As expected, consumer demand falls are greater when moving from the scenario "Option 1" to the scenario "Option 3" as more food waste is reduced and can be recovered for human consumption (quantity effects) and also increasing the relative price of generated waste to food commodities (price effect). On average, agri-food demand drops up to 5.5% in Option 3. In general, the reduction in consumer demand is highest for vegetables, cereals and fruits as these are the commodities with the highest waste shares, thus the uniform reduction of waste across commodities affects these commodities the most. Figure 27 shows demand changes of selected food groups at the MS level for Option 3.

Figure 26: Changes of EU27 consumer demand (%) for selected commodities, options vs baseline 2030



Source: MAGNET simulation results

Figure 27: Changes in consumer demand (%) in EU MS for selected commodities, Option 3 vs baseline 2030

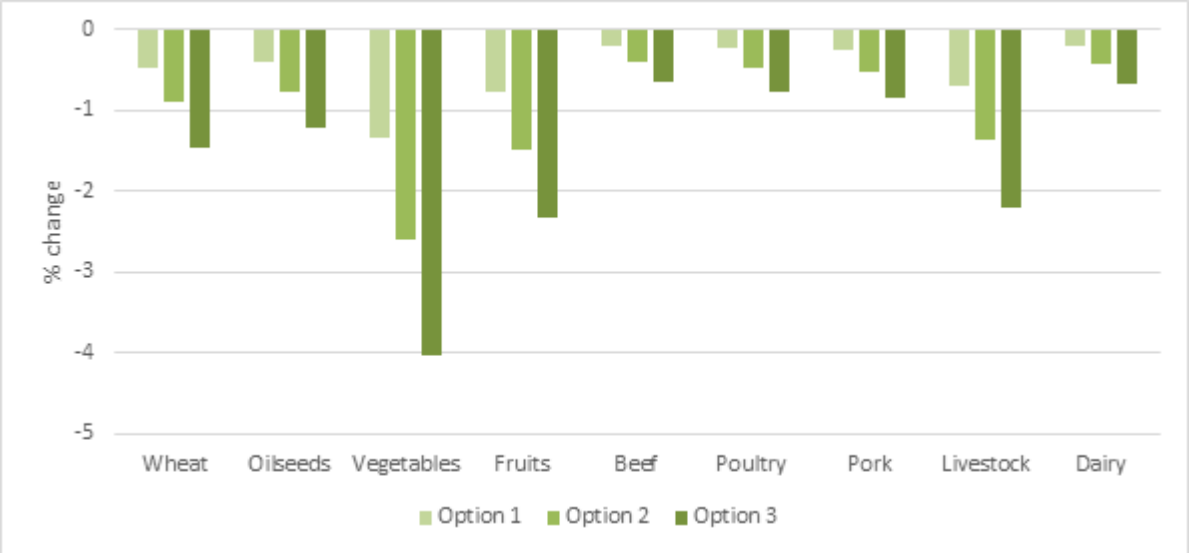


Source: MAGNET simulation results

2.3.2. Price impacts

Figure 28 shows the percentage deviations of EU27 market prices compared to the baseline in 2030 and Figure 85 shows the changes at MS level. As consumer food demand decreases, also prices for agricultural and food commodities decrease. The effects are particularly pronounced for vegetables and fruits and marginal for animal protein. The average price of agri-food decreases from 0.3% (Option 1) to 1% (Option 3).

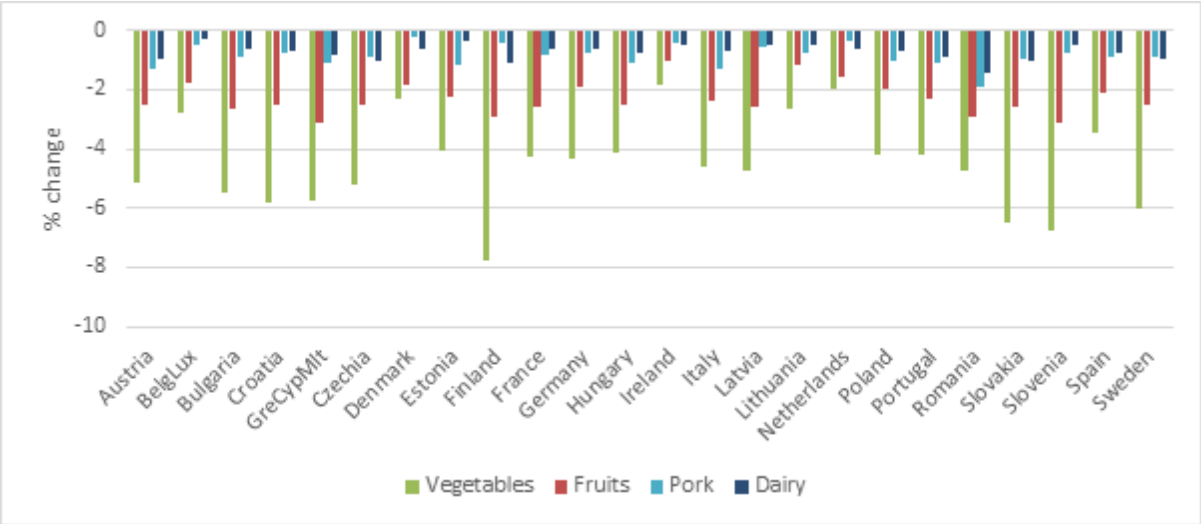
Figure 28: Changes of EU27 market prices (%) for selected commodities, options vs baseline 2030



Source: MAGNET simulation results

However, the prices changes significantly differ across Member States. These effects are mainly driven by the underlying waste shares that determine how much of food is recovered by achieving a certain target, and thus have a clear influence on price and quantity effects.

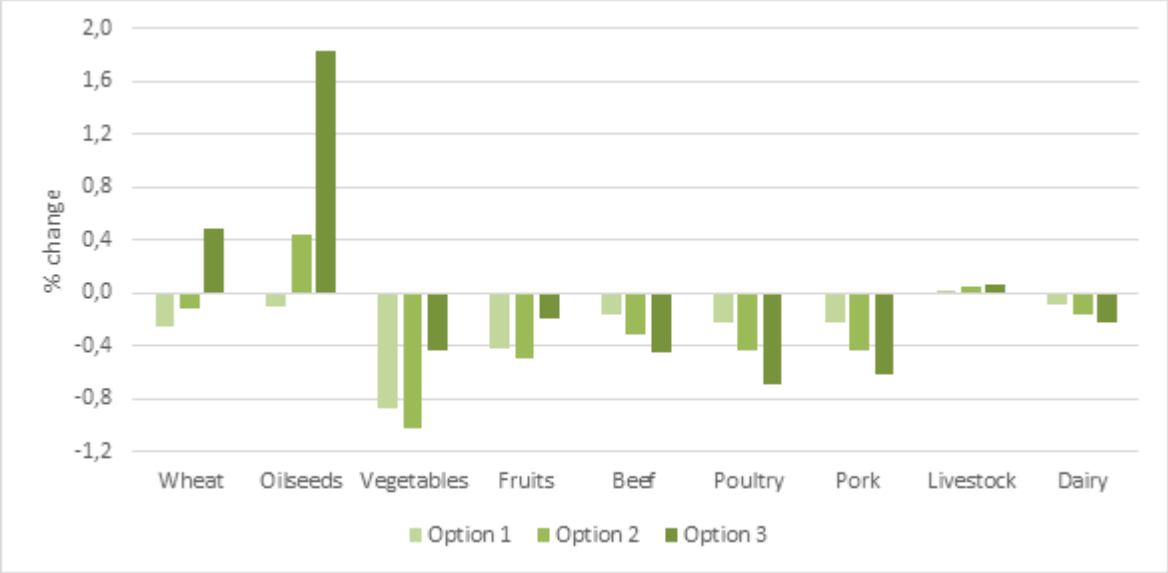
Figure 29: Changes of market prices (%) in EU MS for selected commodities, Option 3 vs baseline 2030



Source: MAGNET simulation results

We see higher and mixed movements in consumer prices than that of market prices for particular sectors (see Figure 30). That is because consumer prices also include the cost of reducing food waste to the households. Thus, the consumer price change reflects the net effect. While in some commodities prices increase, in other commodities price decreases occur at the EU level. For instance, price of oilseeds is to increase by more than 4% in the most advanced scenario but for animal protein there are price decreases. We also see mixed impact of scenarios. In most cases, higher food waste reduction targets lead to higher changes – either decreasing or increasing. However, consumer price of vegetables and fruits decrease in Option 1 and Option 2 whereas they increase in Option 3.

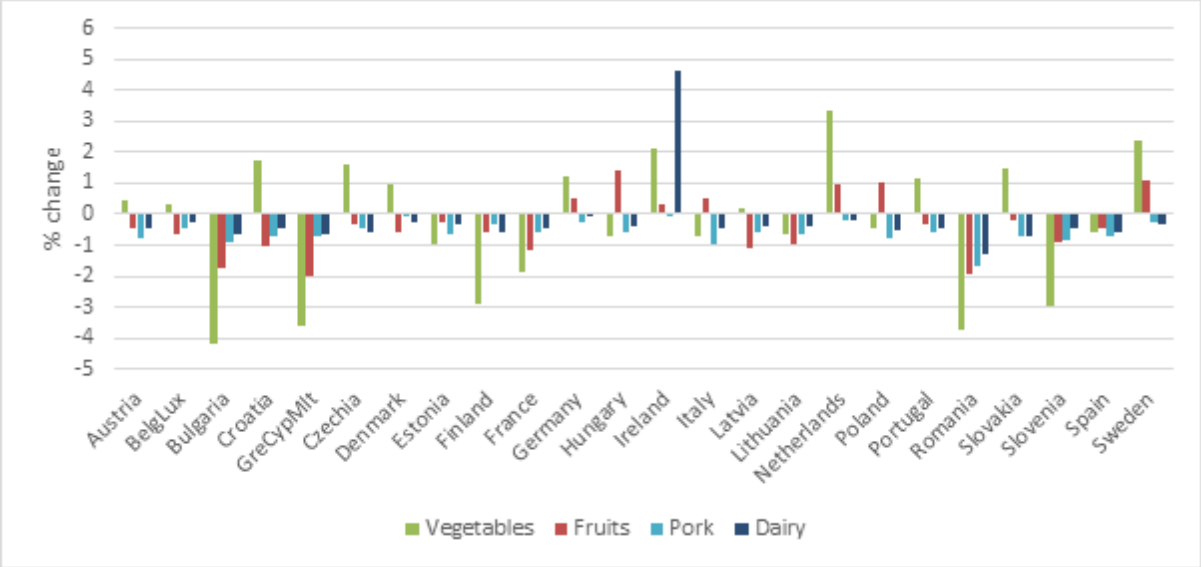
Figure 30: Changes in EU27 consumer prices (%) for selected commodities, options vs baseline 2030



Source: MAGNET simulation results

Similar to market prices, deviations in consumer prices change significantly across Member States and across sectors. One of the highest price changes are observed in the vegetables sector – up to 10% increase in the Netherlands. However, in some MSs there are price decreases.

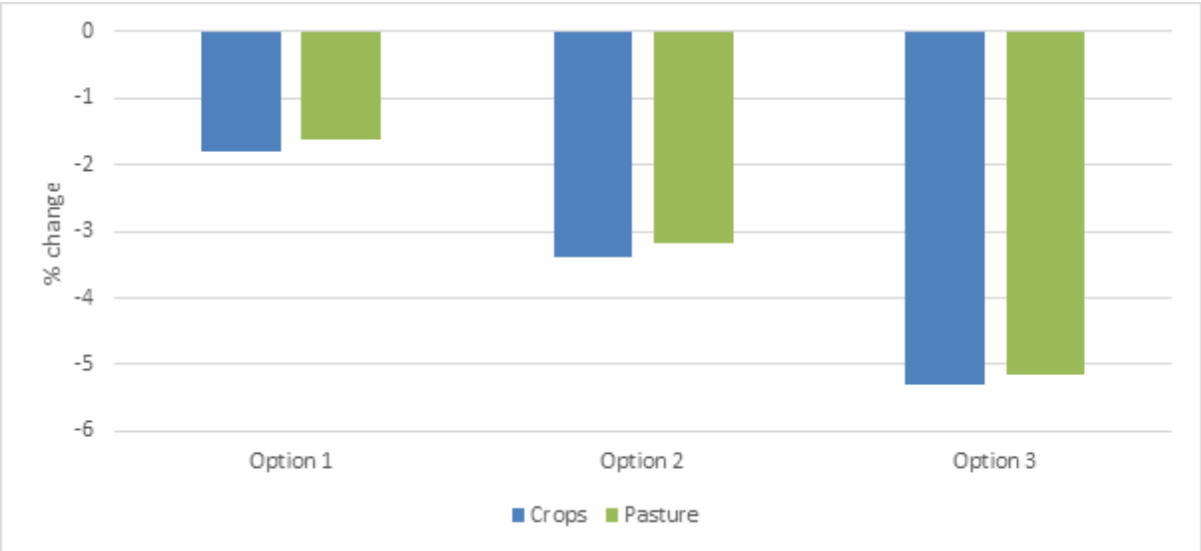
Figure 31: Changes in consumer prices (%) in EU MS for selected commodities, Option 3 vs baseline 2030



Source: MAGNET simulation results

Reductions in demand for agri-food in the EU and the price impact that it creates is also reflected in land prices. As shown in Figure 32, there is also a decrease in land prices for primary agriculture in the EU, which reaches up to 5% in the highest target scenario Option 3. The decrease for crops and pasture are in similar ranges in all scenarios.

Figure 32: Change in land prices in EU (% change, options vs baseline 2030

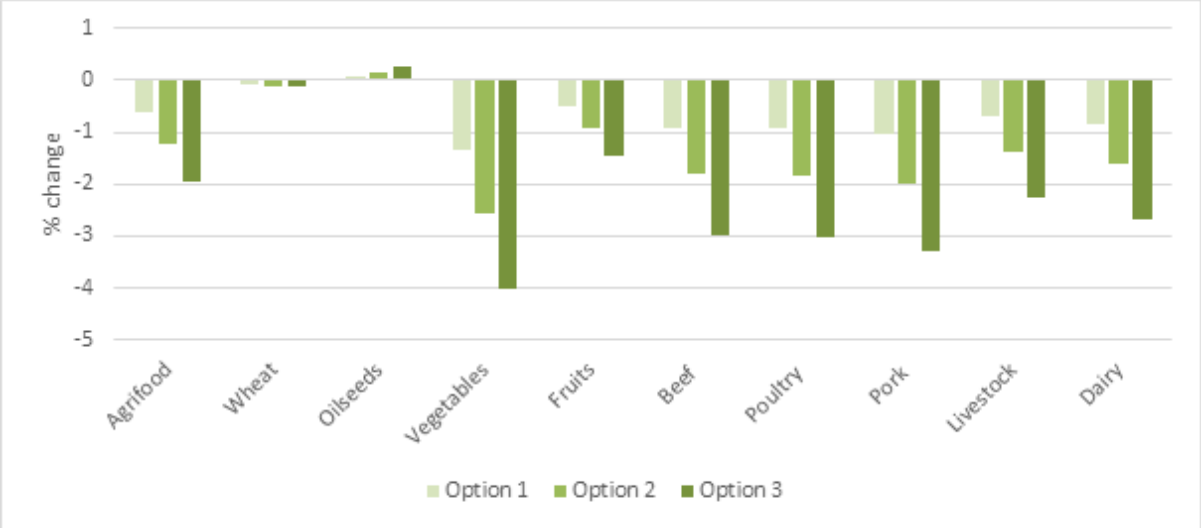


Source: MAGNET simulation results

2.3.3. Production impacts

Reducing food waste associated with primary agricultural production (i.e., post-harvest losses) leads to an increased availability of agricultural commodities at each given price so that prices would need to decrease in order to achieve a new market equilibrium at which less agricultural commodities are sold at lower market prices. In our simulations we consider food waste reduction at processing, retail and consumer stages that result in an additional decrease of agricultural and food commodity demand, which in return leads to a fall in market prices and a reduction of agricultural and food supply to achieve a new market equilibrium. Figure 33 shows the percentage changes of agricultural and food supply in the selected policy options compared to the baseline in 2030. On average agri-food production is estimated to decrease from 0.6% (Option 1) to -2% (Option 3), however at the commodity level there are differences. While most of the commodities show a reduction in output, the effect on wheat and oilseeds differs. This can be explained by less waste shares in cereals and oilseeds than mainly that of vegetables and fruits. Also, the small increase in oilseeds production can be traced back to the decreasing demand and production of vegetables and fruits - the land that is freed up from the production of this sector which is now potentially filled by oilseeds over time as a rebound effect.

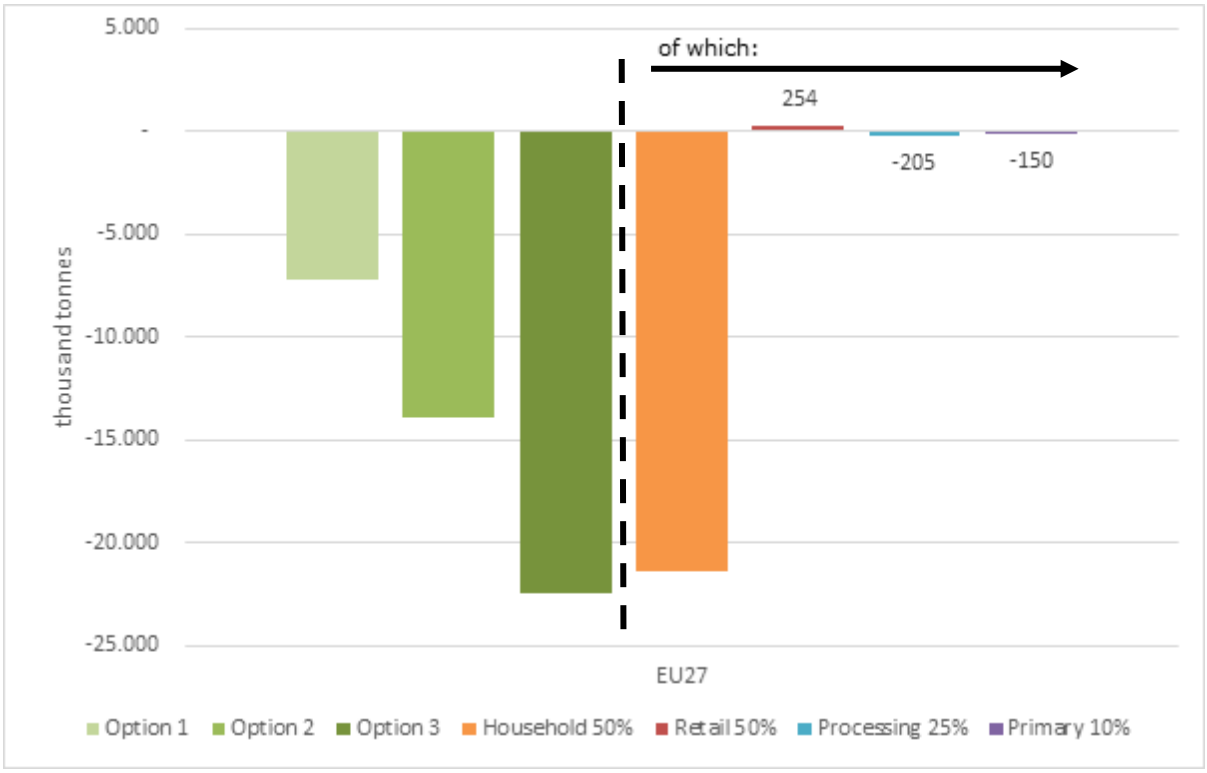
Figure 33: Change in EU27 agricultural production for selected commodities, options vs baseline in 2030



Source: MAGNET simulation results

The higher the reduction target, the larger is the impact on agricultural and food output. Figure 34 shows the decomposition of the results by stage of the supply chain considering absolute deviation of agricultural and food output expressed in ktons compared to the baseline in 2030, which shows that the results are driven by the reduction of food waste at the consumer level while the other stages contribute much less. This is partially explained by the reduction target to be achieved, which is highest for the consumer level and by the waste share of each stage but also by the cost associated with achieving the reduction of food waste.

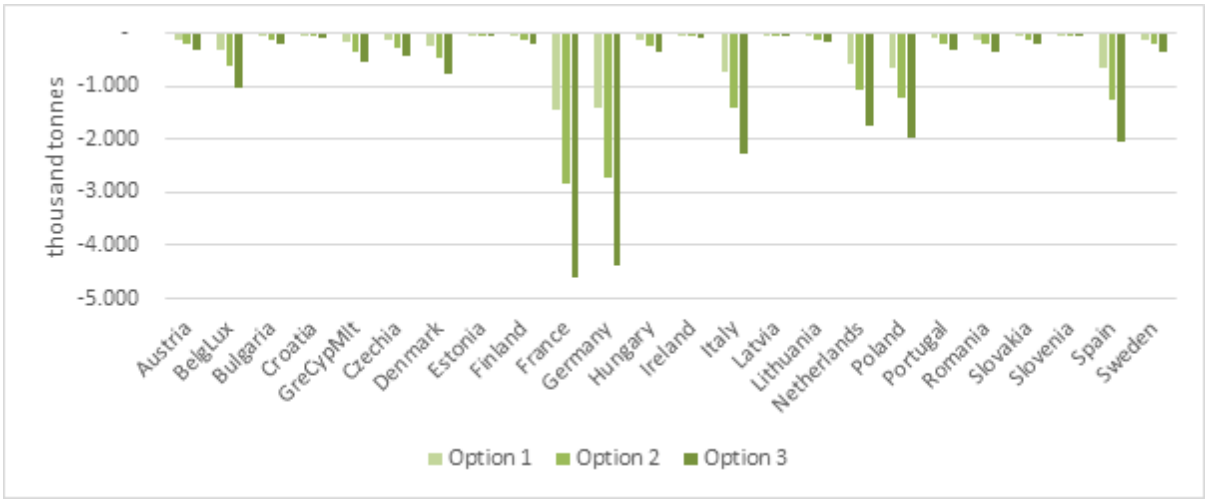
Figure 34: Changes in EU27 agricultural production compared to the baseline in 2030



Source: MAGNET simulation results

In addition to that, Figure 35 shows the absolute changes compared to the baseline in 2030 by Member State for the selected options while Figure 36 shows the absolute changes by Member State for selected food commodities for Option 3.

Figure 35: Changes in agricultural production (kton) in EU MS for agri-food commodities, options vs baseline 2030



Source: MAGNET simulation results

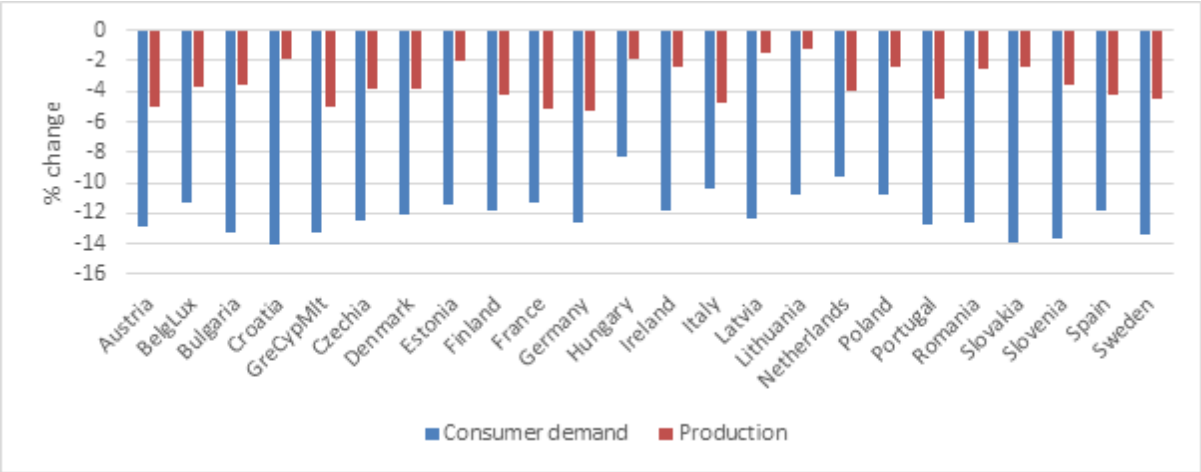
Figure 36: Changes in agricultural production (thousand tonnes) in EU MS for selected commodities, Option 3 vs baseline 2030



Source: MAGNET simulation results

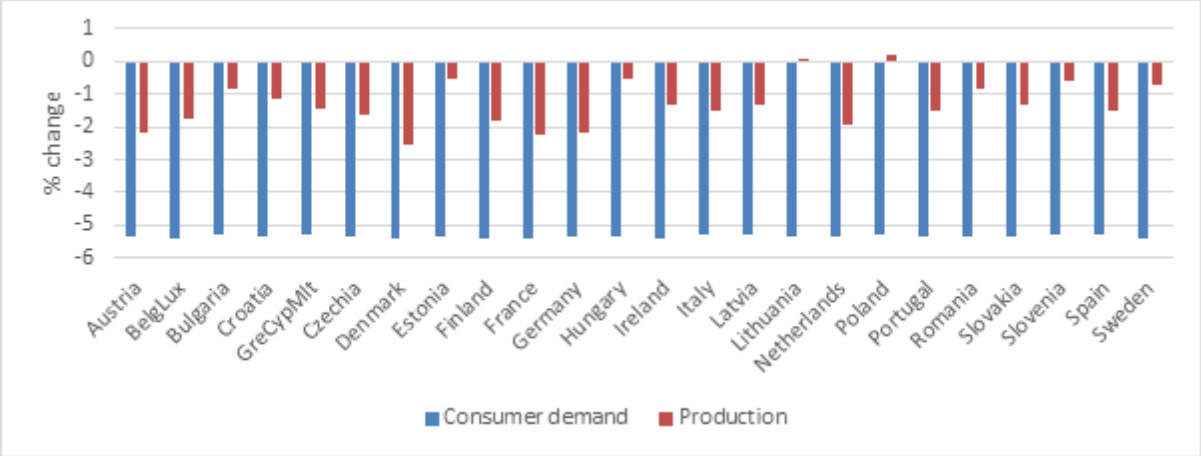
Taking vegetables (Figure 37) and fruits (Figure 38) as an example, the graphs show the percentage changes of production and consumption compared to the baseline in 2030. It becomes apparent that food waste reduction results in a larger percentage reduction of consumer demand compared to the decrease or in some cases increase of production. As market prices in the EU fall, producers become more competitive on the world market, and thus could potentially increase their export to the world market in order to buffer the demand shock.

Figure 37: Vegetables: Changes in agricultural production and consumer demand in EU MS (%), Option 3 vs baseline 2030



Source: MAGNET simulation results

Figure 38: Fruits: Changes in agricultural production and consumer demand in EU MS (%),, Option 3 vs baseline 2030



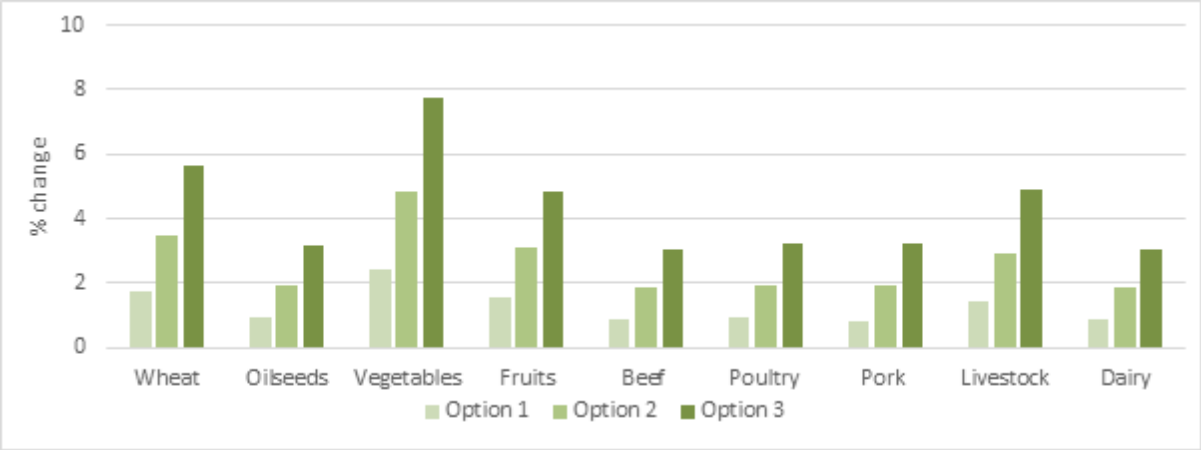
Source: MAGNET simulation results

2.3.4. Trade impacts

Food waste reduction in general could lead to higher extra-EU agri-food exports and lower agri-food extra-EU imports. Figure 39 and Figure 40 show percentage change deviations in EU's exports to non-EU countries and imports from them for a selected group of agri-food products, calculated for different policy options with respect to the baseline in 2030. Increasing the target rate for food waste reduction results in higher exports and lower imports.

Regarding extra-EU agri-food exports, the highest increase is seen in the vegetables sector (rise by 7% in Option 3). Vegetables is one of the sectors with the highest waste shares, hence reducing food waste in this sector would lead to lower demand by consumers and lower production volumes as explained in Section 2.3.1 and Section 2.3.3. In the end EU producers are expected to export more agri-food products to non-EU countries in the short to medium term.

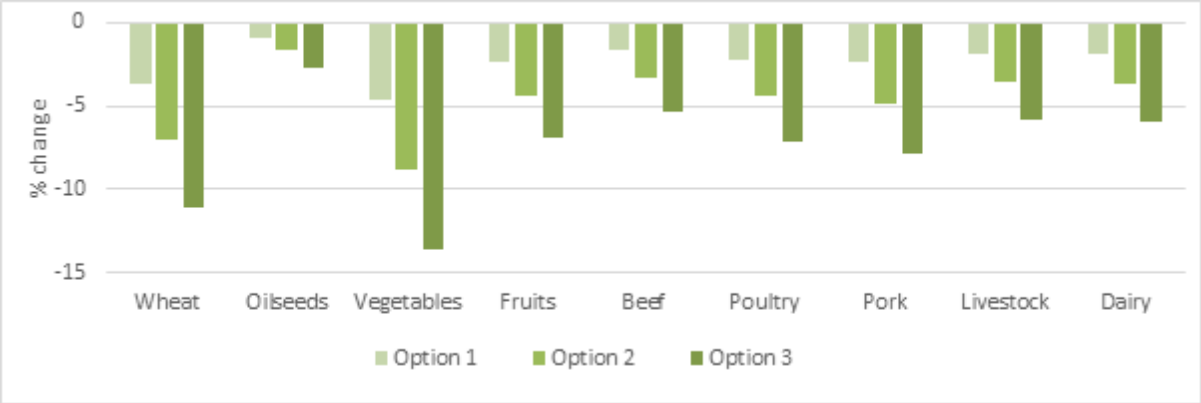
Figure 39: Percentage change deviation in extra-EU exports, options vs baseline 2030



Source: MAGNET simulation results

Changes observed in extra-EU exports are reflected on extra-EU imports (Figure 40). Option 3 - that leads to a 7% increase of EU's vegetable exports- leads to a decrease 12% in EU's imports. For wheat, the pattern is the same, with an increase of over 5% in extra-EU exports with a decrease of imports by 10% in Option 3.

Figure 40: Percentage change deviation in extra-EU imports, options vs baseline 2030

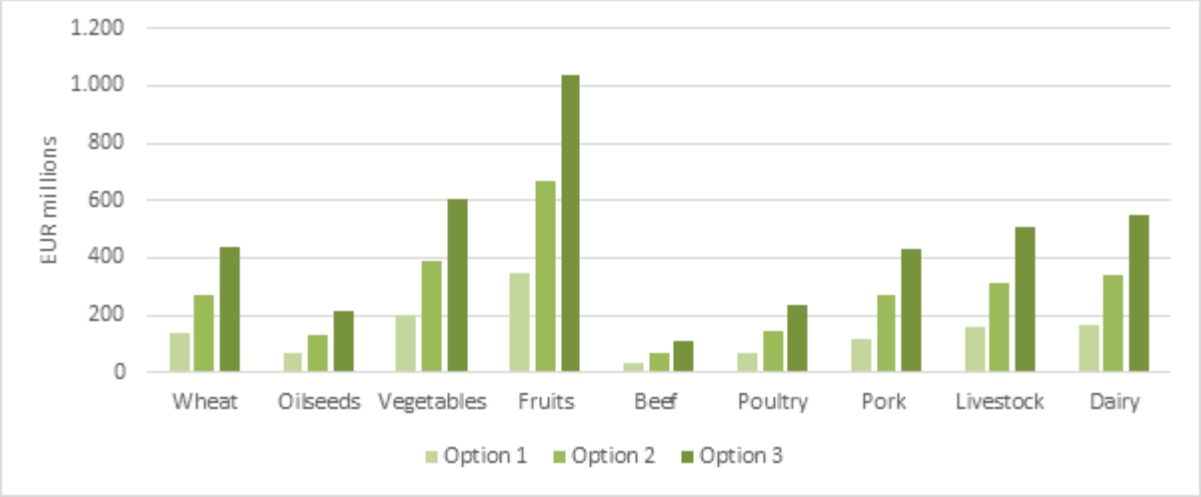


Source: MAGNET simulation results

The impact of food waste reduction scenarios on intra-EU trade is more limited than the impact on extra-EU trade. For instance, intra-EU trade of fruits could decrease by only 0.6% in Option 1 to 1.8% in Option 3. For vegetables, the expected decrease is higher by 1.5% to 4.2%.

The generally decreasing trend in extra-EU imports and increasing in extra-EU exports leads to an increase of EU's agri-food trade baseline across all options versus the baseline in 2030. In value terms, the highest increase in the agri-food trade balance is seen in the fruits sector, which is negative in the baseline. Food waste reduction leads to an improvement in the fruits trade balance that ranges from nearly EUR 350 million to over EUR one billion depending on the option (Figure 41), hence decreasing the trade deficit in fruits up to 11% in Option 3.

Figure 41: Change in EU's agri-food trade balance by food groups options vs baseline 2030

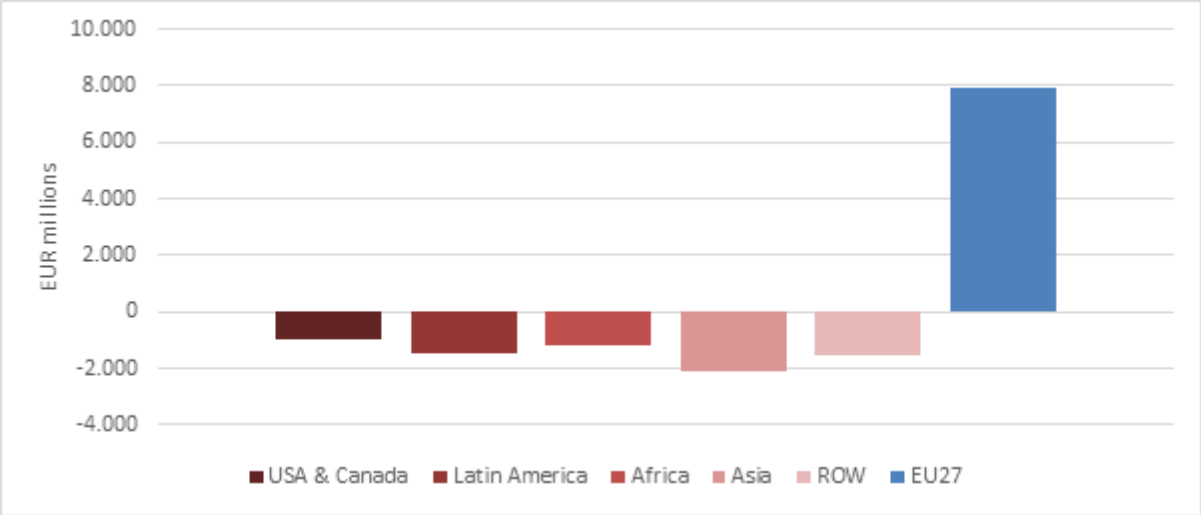


Source: MAGNET simulation results

Also driven by lower EU prices and increased competitiveness of EU producers in the world market, impact of food waste reduction is positive for the EU's agri-food trade balance – at

least in the short term to the medium term until markets adapt to the generation of less food waste. With the policy Option 3, the expected increase in the EU's agri-food trade balance amounts nearly to EUR 7 900 millions, whereas we observe decreases in the agri-food trade balance of non-EU countries. Figure 42 depicts these changes for Option 3. Asia's trade balance in agri-food is to decrease the most mainly lead by declining trade balance in dairy and livestock. For Latin America, the decrease primarily results from the fruits sector given the highest share of fruit imports of the EU from this region and expected less imports of EU.

Figure 42: Change deviation in agri-food trade balance Option 3 vs baseline 2030



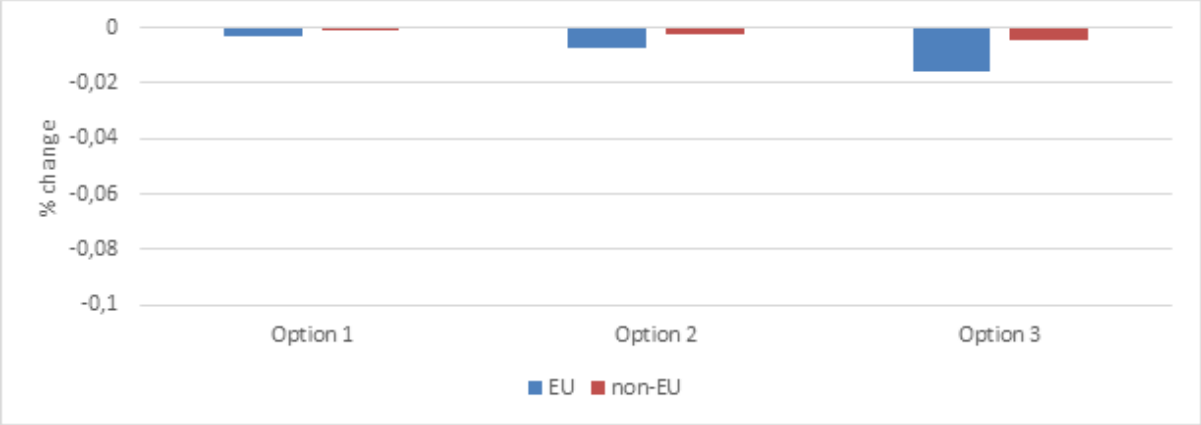
Source: MAGNET simulation results

It should be noted that this is based on the assumption that while non-EU countries may be engaging in food waste prevention as part of their commitment to the global SDG Target 12.3, they are not implementing similar food waste reduction policies (i.e., legally binding targets) and/or implementing such policies at a slower pace. If they do, the advantage of the EU will decrease proportionally to their progress.

2.3.5. GDP and income

Food waste reduction scenarios have marginal macroeconomic impact on the real GDP of the EU and non-EU countries as a total whereas the impact increases with higher food waste reduction targets (Figure 43). Even with the most advanced reduction targets, there is a decline in EU27 GDP of less than 0.02%. On the other hand, although not depicted in Figure 43, there is a small increase in GDP per capita (up to 0.05% for the EU27 average in Option 3). For the rest of the world the impact is negligible.

Figure 43: Change deviation in real GDP for EU and non-EU, options vs baseline 2030



Source: MAGNET simulation results

The impact of food waste reduction on the GDP of individual EU27 countries is given in Figure 44. Although the total impact on GDP is negative and small, we see a more mixed impact at the Member State level. In most cases, impacts are negative and, even with the highest reduction scenario (Option 3), they are very limited, with less than 0.1% decline. On the other hand, some countries (e.g., Bulgaria Lithuania) experience GDP growth with decreasing their food waste. However, this increase is also very limited and reaches 0 05% only in the highest case.

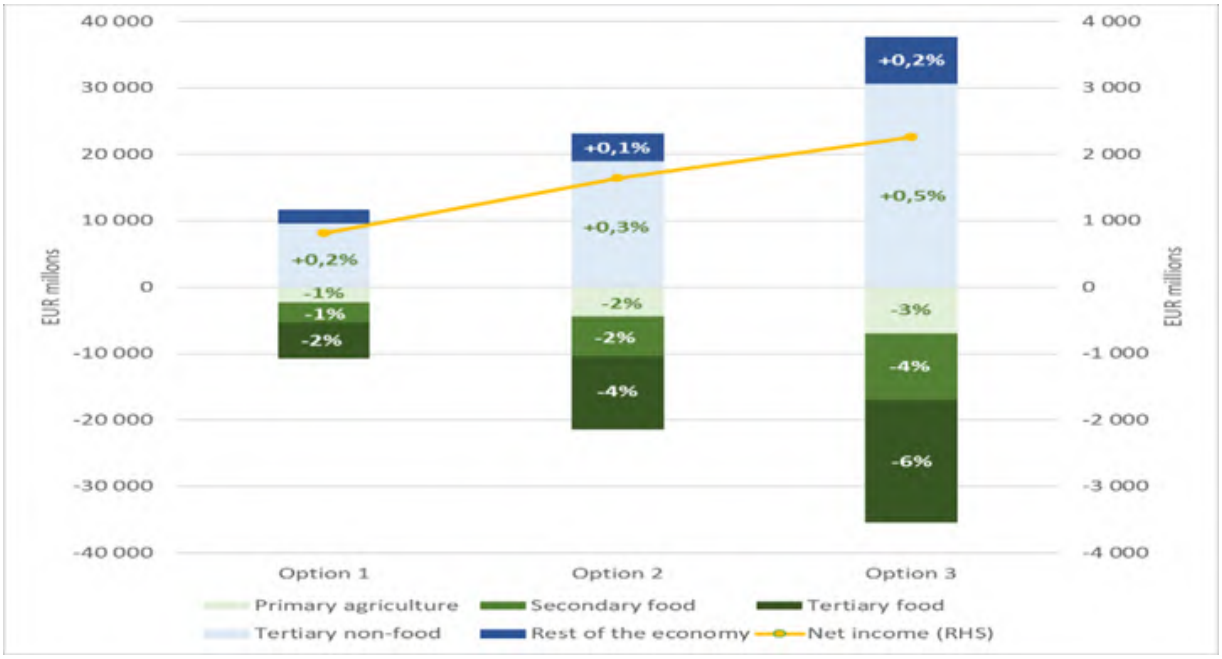
Figure 44: Change deviation in real GDP at MS level, options vs baseline 2030



Source: MAGNET simulation results

The effects on income (value added) in total remain unchanged for the EU aggregate: even a small increase of EUR 800 million to over EUR 2.2 billion can be observed depending on the option (Figure 45).

Figure 45: Changes in total income in EU27, options compared to baseline (2030) for different actors

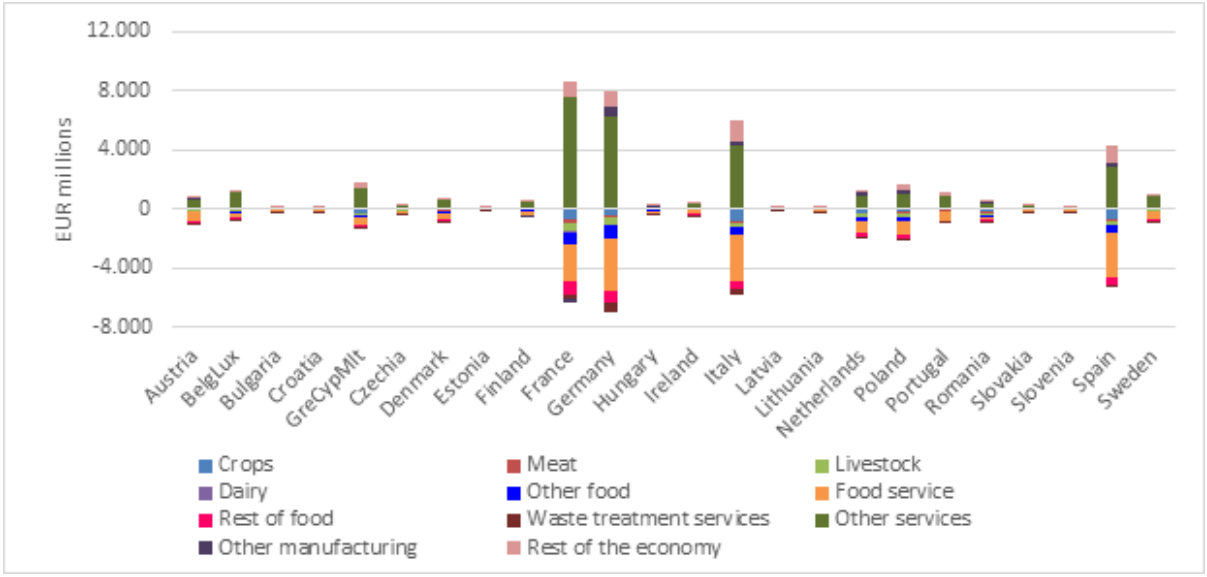


Note: Rest of the economy includes a broad number of sectors with either positive or negative income changes.

Source: MAGNET simulation results

Figure 46 shows the changes in income per Member State and per sector. The income of the agri-food sector (including food processing but not food services) experiences a slight decrease of -3.6%. Impacts are higher in the food service sector. The losses in the food sector are in general compensated by additional income in non-food sectors.

Figure 46: Changes in income in EU MS, Option 3 vs baseline 2030



Source: MAGNET simulation results

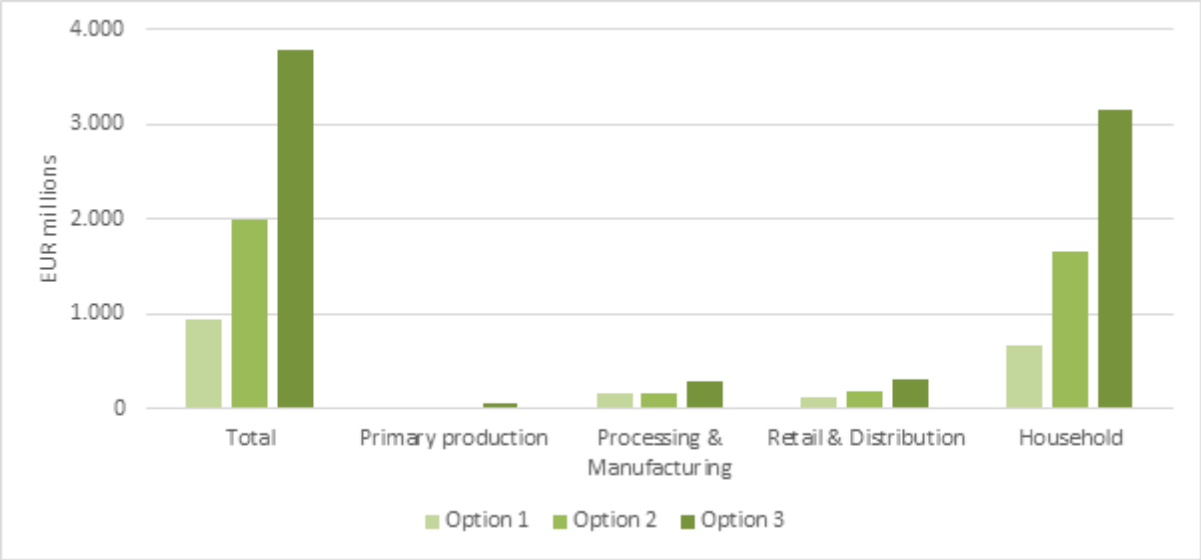
2.3.6. Estimated adjustment costs associated with food waste reduction

This section discusses the cost associated with food waste reduction along the stages of the supply chain to the end users. As introduced in Section **Error! Reference source not found.** of Annex 4, waste generation in production and consumption are the resulting market externalities arising from rational agent behaviour.

To account for these negative externalities associated with food waste, and thus correct the market failure, an adjustment cost must be imposed on the corresponding agent to internalise (partly) the full (social) cost associated with waste. In the model assessment, these costs are estimated by inserting taxes on those agents that generate food waste from the farmgate to the end user.

The total adjustment costs for food waste reduction (calculated separately per supply chain and then aggregated) are estimated to be around EUR 0.9 bn for Option 1, EUR 2 bn for Option 2, and EUR 3.8 bn for Option 3 (Figure 47). Since the largest share of food waste is generated at the consumption stage, the costs associated with food waste reduction at this stage are the highest (exceeding EUR 3 bn in Option 3). The total adjustment costs for the industry are estimated to be relatively lower.

Figure 47: Estimated adjustment costs associated with food waste reduction per stage of food supply chain, EU27 – options vs baseline 2030



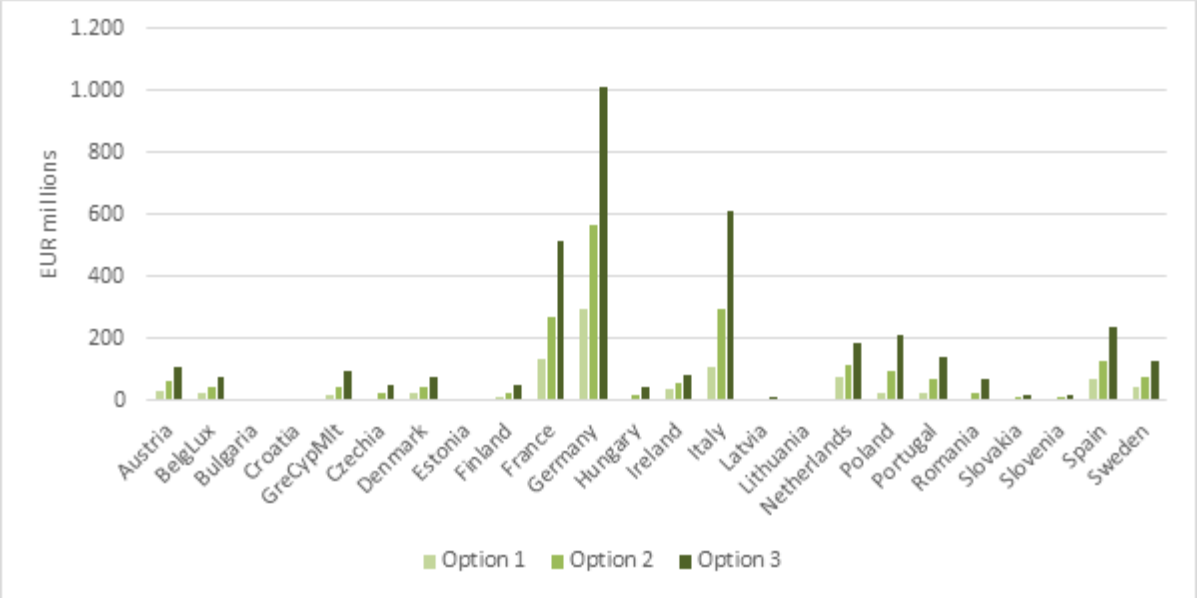
Source: MAGNET simulation results

Figure 48 below shows the total costs associated with food waste reduction in the Member States for the three options. The costs are calculated separately per supply chain and then aggregated to represent the total costs per country and per option. Reaching the targets in Option 1 comes at comparably low cost, while costs tend to increase when moving to the higher food waste reduction targets as in Option 2 and Option 3. These costs differ significantly across Member States. As shown in Figure 48, total food waste reduction costs are small in EU13[153] countries. These countries have relatively lower food waste quantities

[153] EU13 countries: Bulgaria, Croatia, Cyprus, Czechia, Estonia, Hungary, Latvia, Lithuania, Malta, Poland, Romania, Slovakia and Slovenia

compared to the EU average in the baseline. According to the size of the countries, highest costs are observed in Germany, reaching up to 1 EUR billion in Option 3, followed by Italy (600 EUR million) and France (500 EUR million). In these Member States, absolute food waste quantities are the highest in the 2030 baseline, leading to higher amounts of food waste to be reduced per option.

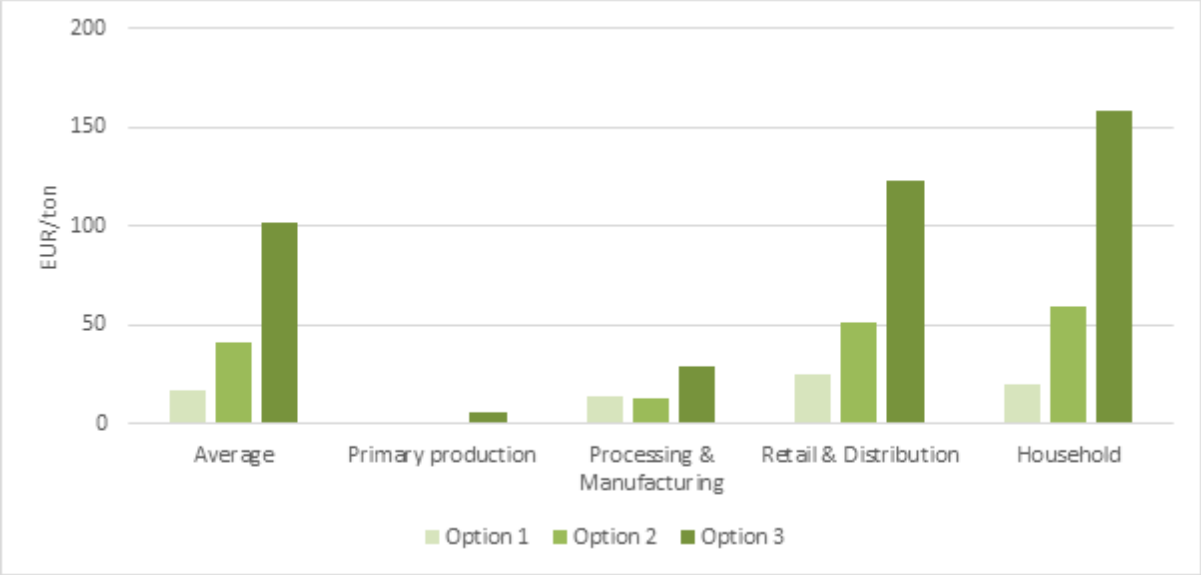
Figure 48: Total estimated adjustment costs associated with food waste reduction, EU MSs – options vs baseline 2030



Source: MAGNET simulation results

Regarding adjustment costs per ton of food waste reduced, on average, the costs range from EUR 17 per ton in Option 1 to over EUR 100 per ton in Option 3 (Figure 49). At the individual stage level, highest costs occur for households – reaching up to EUR 160 per ton (Option 3). However, costs for the retail and distribution sector are also estimated to be over EUR 100 per ton (Option 3) due to high targets of food waste reduction (50%).

Figure 49: Adjustment costs of food waste reduction per ton of food waste reduced, EU27 – options vs baseline 2030

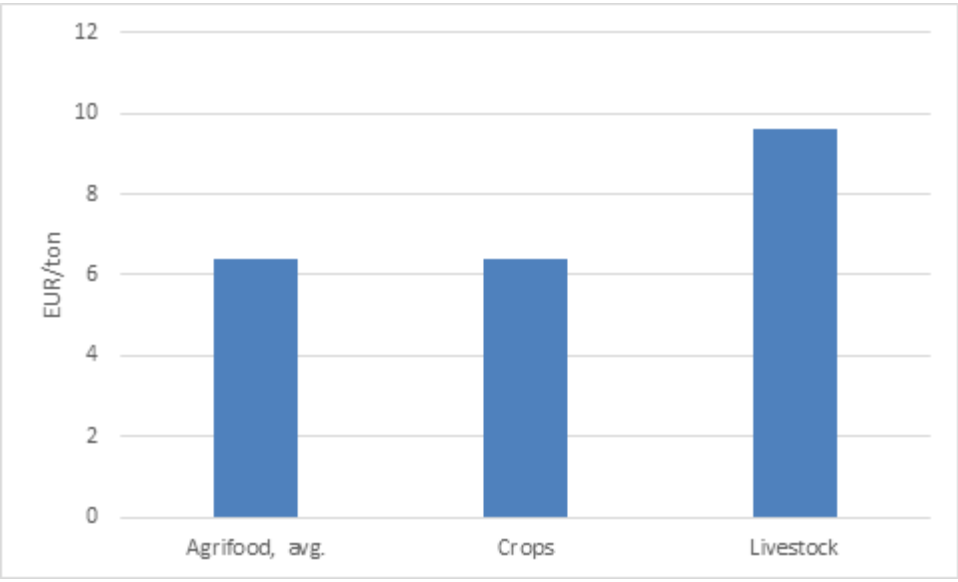


Source: MAGNET simulation results

Primary production

As only Option 3 targets food waste reductions at the primary production level, we report only the results of Option 3 in Figure 50. A 10% reduction of food waste in the production stage leads to an average adjustment cost of around 6 EUR per ton of food waste reduced. This cost is mainly driven by the waste reductions in the crop sector, with adjustment costs estimated similarly at around 6 EUR per ton. The costs for livestock production are slightly higher, however they influence the average price less than the crops sector as primary production only considers livestock farming and excludes processing.

Figure 50: Adjustment costs associated with 10% food waste reduction at the primary production stage, EU27, Option 3 vs baseline



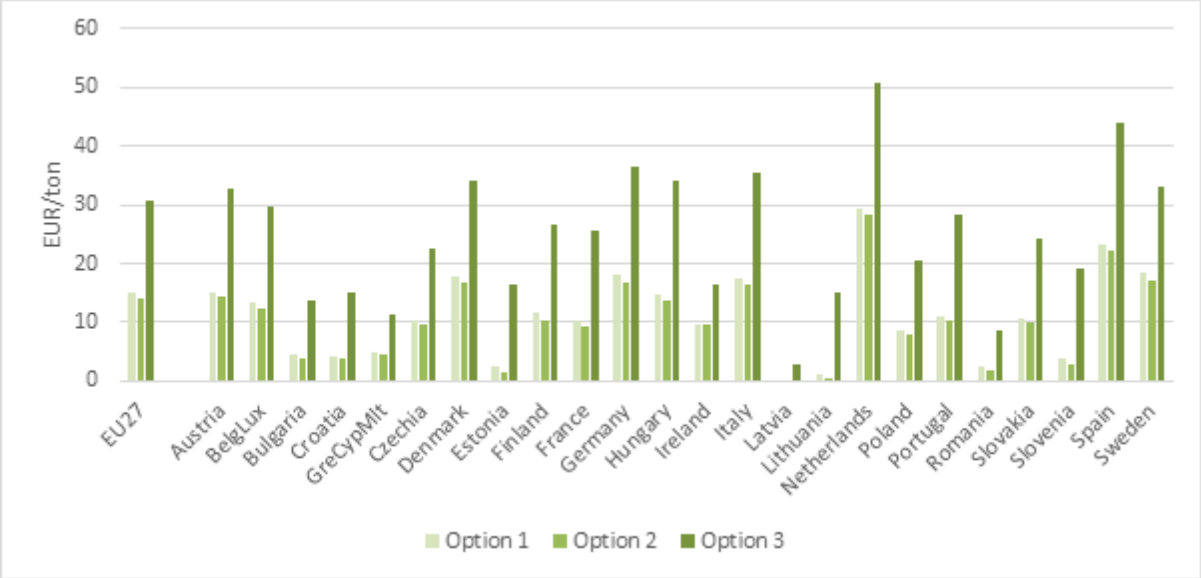
Source: MAGNET simulation results

Processing and manufacturing

Adjustment costs of food waste reduction per ton of food waste reduced at the processing and manufacturing stage, start from 19 EUR/ton in Option 1, and reaches up to 29 EUR/ton in Option 3, on average, for food and agriculture commodities, as shown in Figure 50 in the previous sub-section.

Figure 51 shows the average adjustment costs associated with food waste reduction at the processing and manufacturing sectors across MSs. While the costs vary significantly across MSs, in the majority of MSs, they are lower than the EU average. Particularly the Netherlands and Spain face the highest costs which are higher than 40 EUR per ton.

Figure 51: Cost associated with food waste reduction at the processing stage across Member States, options vs baseline 2030

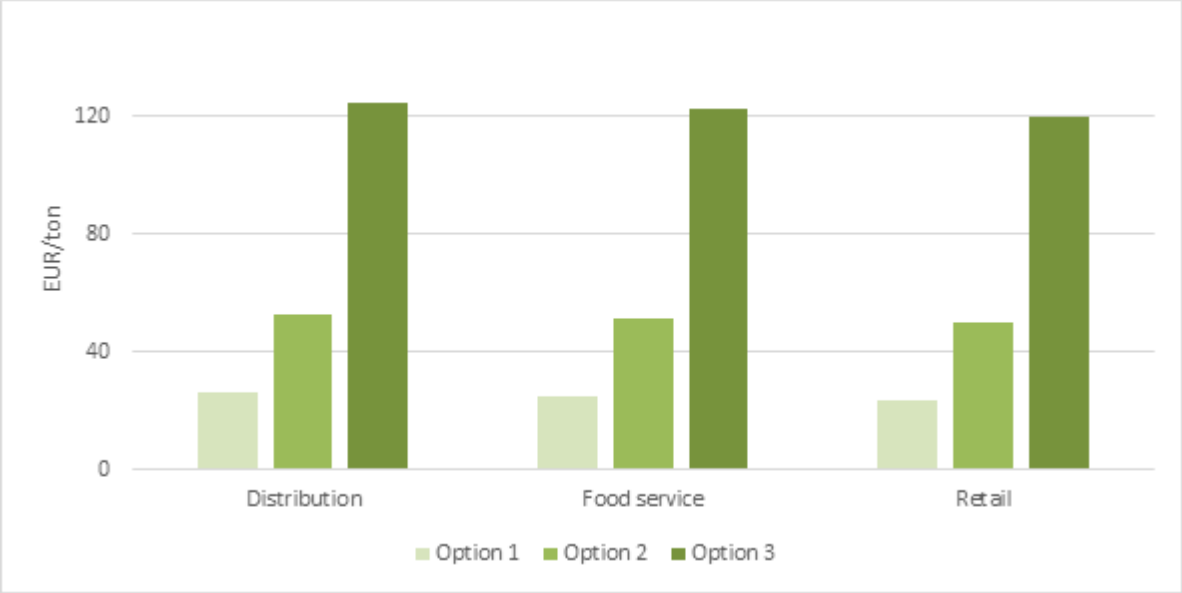


Source: MAGNET simulation results

Retail and Distribution

On average, adjustment costs of food waste reduction per ton of food waste reduced for the retail and distribution sector is estimated to start from 25 EUR/ton in Option 1 and increase up to 123 EUR/ton in Option 3. Figure 52 shows the cost associated with food waste reduction at the retail and distribution stage for the three options that is split into the following retail categories: distribution, food services, and agri-food retail. Costs increase as the ambition with regard to food waste reduction increases; however, they are within the same range across retail categories in all options.

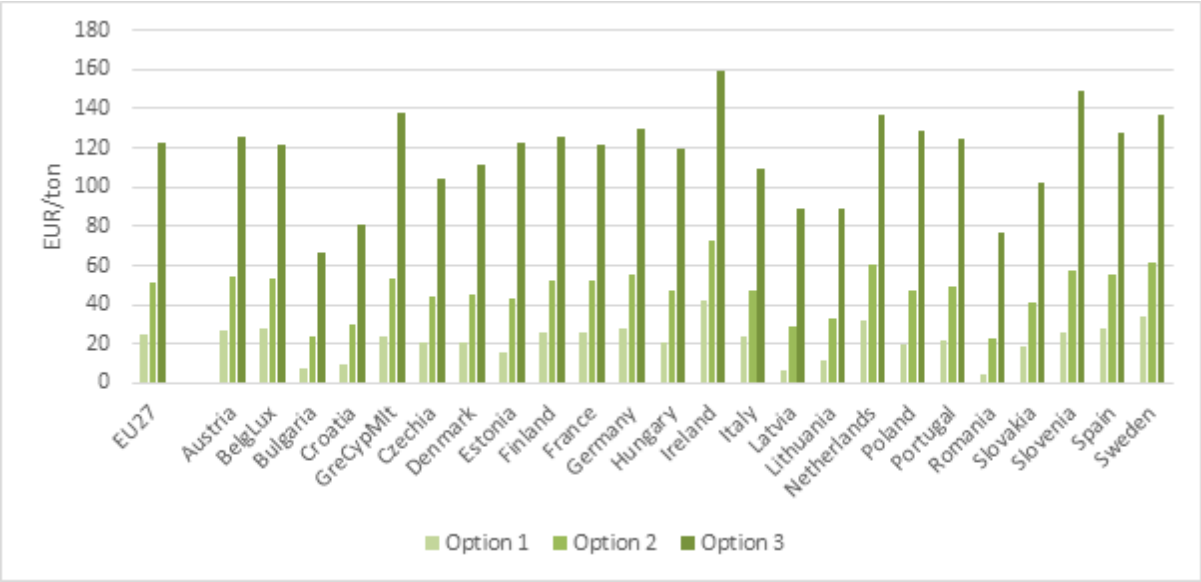
Figure 52: Adjustment costs associated with food waste reduction at the retail stage EUR/ton, EU27, options vs baseline, 2030



Source: MAGNET simulation results

Figure 53 shows the average costs associated with food waste reduction across all policy options at the individual MS level. Most countries face adjustment costs that are over 100 EUR per ton. While the lowest costs are observed for Bulgaria and Romania, the highest cost occurs in Ireland.

Figure 53: Average costs associated with food waste reduction at the retail stage across MSs, options vs baseline, 2030

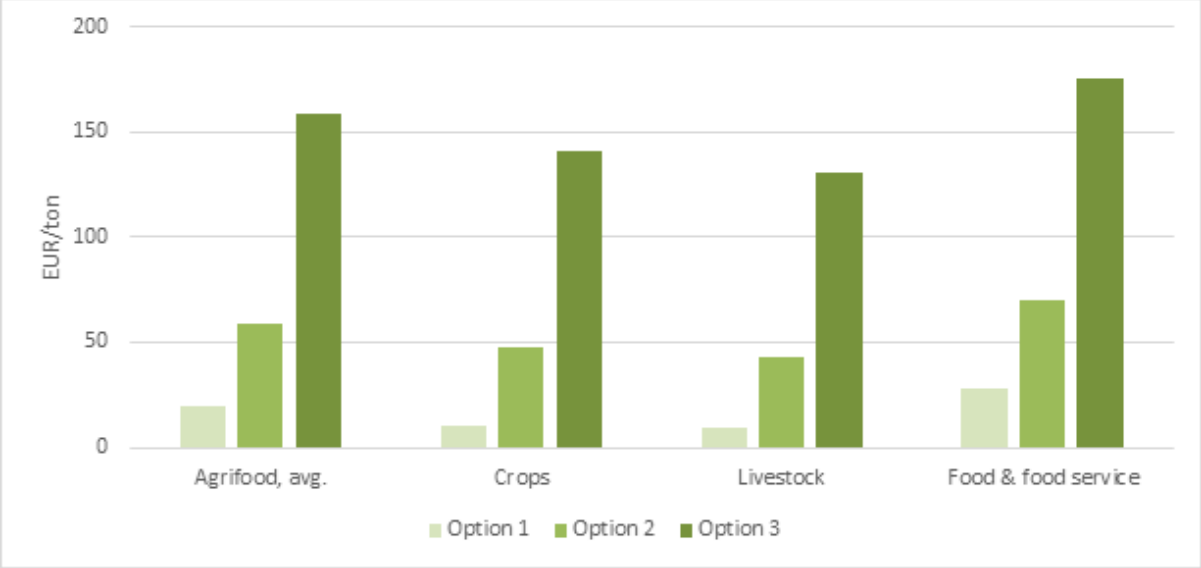


Source: MAGNET simulation results

Households

Figure 54 shows the cost associated with household food waste reduction in the EU27 for the three options, expressed in EUR per ton for the average of the food and agriculture sector, and at a more granular level for crops, livestock, and food and food services. Reaching the targets in Option 1 comes at a comparably low cost. The cost associated with food waste reduction is estimated to be 20 EUR/ton for agri-food on average, but costs tend to increase more than proportionally when moving to higher reduction targets in Option 2 (60 EUR/ton) and in Option 3 (160 EUR/ton). This more than proportional increase of costs occurs as food waste prevention actions usually first target the areas where savings are easiest to achieve, and after this point, expected costs tend to become higher. At the sector level, the highest costs are noted for food and food services

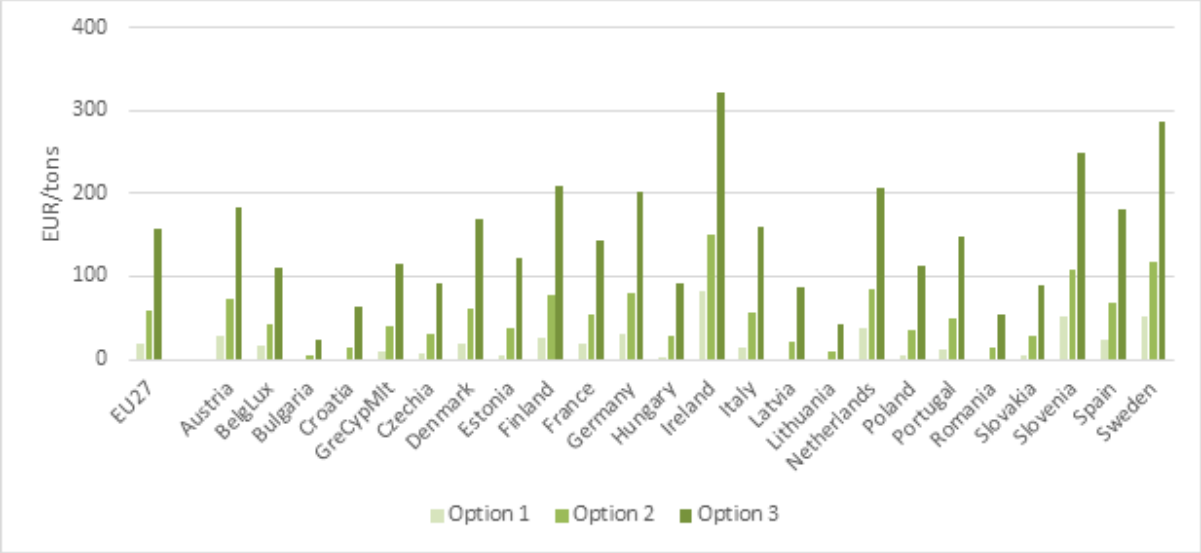
Figure 54: Adjustment costs associated with household food waste reduction, EU27, options vs baseline 2030



Source: MAGNET simulation results

Costs associated with household food reduction differ significantly across MSs. Figure 58 shows that cost tend to be lowest and below EU average in the EU13 MSs. While highest cost is observed in Ireland, food waste reduction at the household level lead to lowest costs in Bulgaria.

Figure 55: Average adjustment costs associated with household food waste reduction, options vs baseline 2030



Source: MAGNET simulation results

The survey sent to stakeholders as part of the targeted consultation (Annex 2) aimed at gathering quantitative data on food waste prevention actions provided some insights on the cost of preventing FW[154]. It received 50 answers on the cost of running the initiatives. 42 respondents provided quantitative data on the amount of prevented food waste achieved by the initiative.

Based on these data, a total cost per tonne of avoided food waste was calculated. The mean value for the whole set of initiatives was 986 EUR/ton, while when considering the 'food redistribution' initiative type, the mean value was lower (475 EUR/ton). These values are higher compared to those derived by the MAGNET model and the few information available in literature (Garcia Herrero et al., 2023). Possible explanations for this difference are few initiatives were reported through the survey; these were were generally small and many were oriented to the achievement of additional objectives (i.e., supporting people in need, helping the professional reinsertion of unemployed people etc.). Moreover, in some cases, initiatives aimed at long term behavioural changes (e.g. school campaigns) while food waste measurements gathered only immediate food waste reductions. For these reasons, and also due to the high variability of the data on costs collected, information from the survey related to costs of food waste prevention were not directly used in the MAGNET model to calculate the macro-economic impacts of targets.

Furthermore, from the analysis of the survey responses, it resulted that, on average, 40% of the costs were linked to setting up the different initiatives with the remaining 60% linked to maintaining them. It is however important to highlight that significant variability was reported in this respect, most likely due to the heterogeneity of the types of initiatives reported but also the duration of the initiatives as the contribution of setting up costs naturally decreases with time.

[154] More details can be found at: De Laurentiis, V, Mancini, L, Casonato, C, Boysen-Urban, K, De Jong, B, M'Barek, R, Sanyé Mengual, E, Sala, S. *Setting the scene for an EU initiative on food waste reduction targets*. Publication Office of the European Union, Luxembourg, 2023, doi: 10.2760/13859, JRC133967

2.4. Social impacts

There are two main social impacts identified from food waste reduction targets: a potential loss of jobs in food production and processing and improved food affordability. Other social impacts such as "inconvenience" or the so-called 'labour-leisure' trade-off ("lost" leisure time linked to more attention to food preparation more trips to the supermarket etc.) are hardly quantifiable but are included in the estimation of the costs linked to the reduction of food waste at consumption level. Similarly, the analysis of social impacts does not include such potential positive impacts as better understanding of impacts of food choices on health and the environment awareness-raising, potentially reducing the possible feelings of guilt and/or frustration associated with discarding food, positive social aspects of sharing food etc.

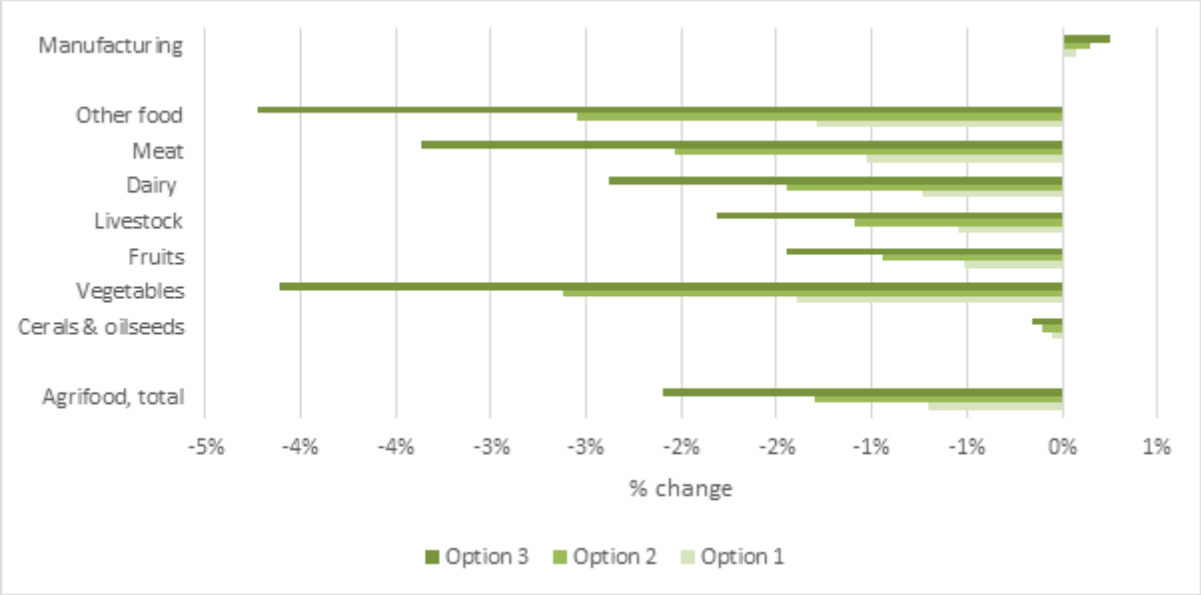
From the responses to the survey sent as part of the targeted consultation (presented in Annex 2), it emerged that food security and poverty reduction are seen as the main social benefit deriving from food waste prevention initiatives. Moreover, additional benefits related to awareness raising, training provided to employees and volunteers' education and social cohesion were also reported.

2.4.1. Employment

In this section we report the estimated impact of food waste reduction on employment with a focus on agriculture and food sectors. The presented employment effects have to be interpreted taking into account the earlier described model specificities regarding the functioning of the employment market.

Looking at the agri-food sector, food waste reduction scenarios generally lead to a decrease in employment as shown in Figure 56. The magnitude of the decrease depends on the level of the food waste reduction target. The impact of lower consumer demand, hence lower production rates, is also seen as decreasing employment in the food and agriculture sector. However, the overall decrease in the total agri-food sector is limited to 2% even in the most ambitious scenario, Option 3. At the sector level, the employment in vegetables and other food sector is expected to decrease the most amongst other sectors (4% in Option 3). On the other hand, employment rises in non-agri-food sectors.

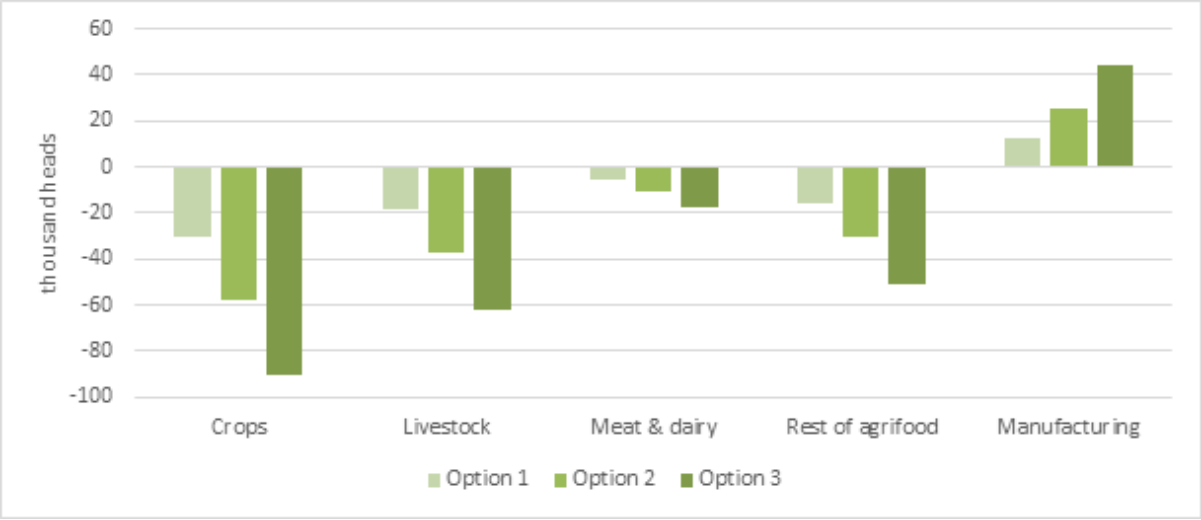
Figure 56: Change in employment in the EU (% change) options vs baseline 2030



Source: MAGNET simulation results

Figure 57 shows the absolute changes in employment for selected sectors. Job numbers decrease for the agri-food sector by 70 000 in Option 1, 135 000 in Option 2, and 220 000 in Option 3. It should be noted that in other sectors, such as manufacturing, new jobs are created.

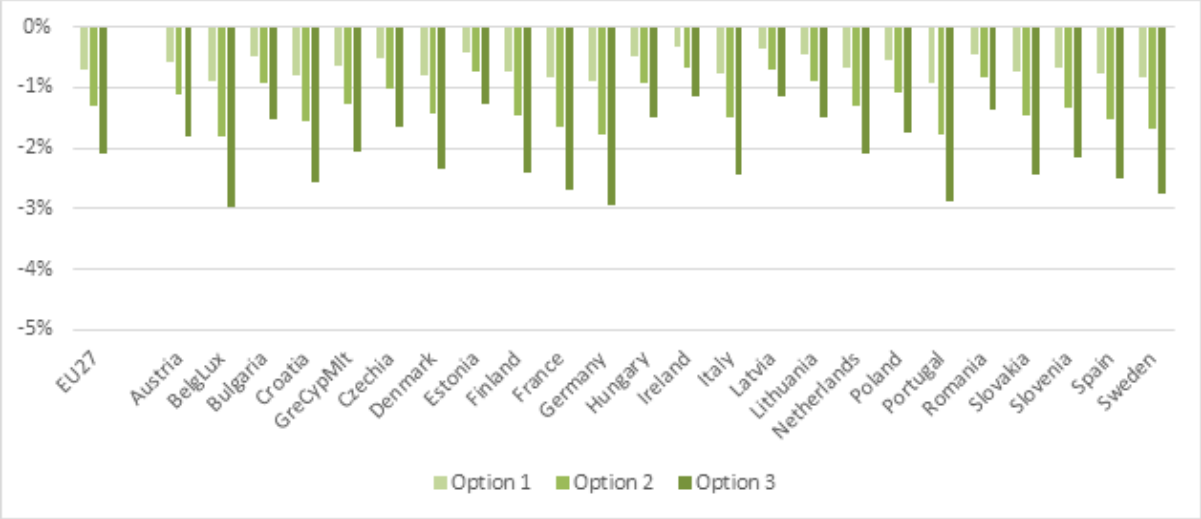
Figure 57: Change in employment in the EU in selected sectors (thousand heads) options vs baseline 2030



Source: MAGNET simulation results

Figure 58 depicts the impact of food waste reduction on agri-food employment for three policy options. Expected reduction varies across Member States – ranging from -0.3% in Option 1 to -3% in Option 3 depending on the country. Largest percentage change decreases are observed for Germany, Portugal, and Belgium and Luxembourg.

Figure 58: Change in agri-food employment in EU MSs, options vs baseline 2030



Source: MAGNET simulation results

The reader is informed that the food service sector (and other service sectors) are not presented in the analysis. While the numbers of the primary and secondary sectors are directly linked to specific activities impacted by food waste reduction, the reaction of the food service sector cannot be represented in a fully satisfactory way. Firstly, the exact composition of the food service sector (i.e., restaurant, delivery services etc.) is not available. Secondly, the possible reaction of consumers to less waste in food services is not straightforward. The expectation to food waste reduction at the food service level is that if consumers behave in a more socially responsible manner (i.e. waste less), they might be expected to cut back on restaurant visits per time period as they consume out-of-home 'leftovers' at home. It is recognised, however, that the reduction in the number of visits to the restaurant is not proportionate to the reduction in waste as people enjoy the experience of eating out. Indeed, individuals with higher disposable income may cut back food services demand considerably less than those with lower incomes. In addition, food services waste reduction could be achieved (partly) by developing/improving management strategies. Thus, in the absence of any empirical evidence, the modelling approach assumes here that the reduction in household demand for food services is in proportion to the reduction in food services waste, thus likely overstating the effect on food services demand of consumers and the associated impacts on employment. Hence, in this section, results for the food service sector ares not presented. As a conclusion, even without the food service sector, the numbers below should be considered as a worst-case scenario. To the extent known, Member States that have taken steps in reducing food waste have not experienced negative impacts on employment in the food supply chain due to this reduction.

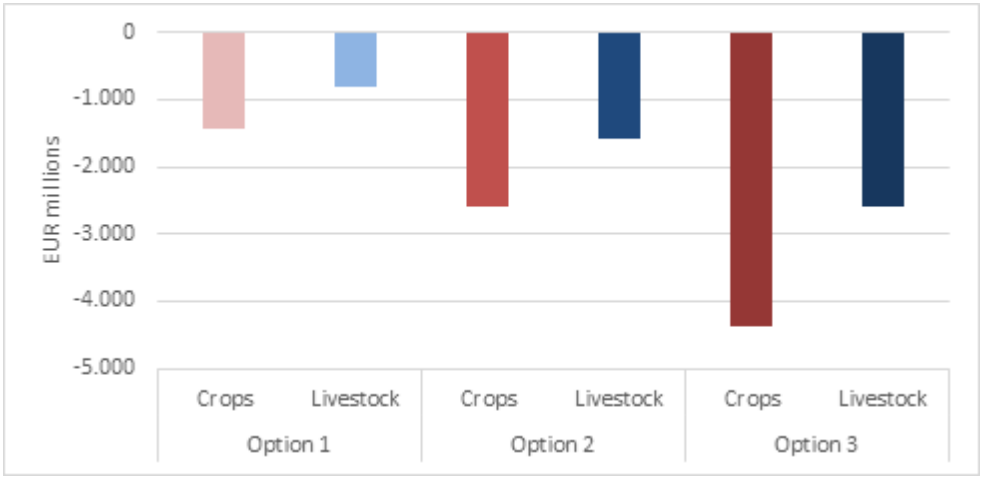
These results do also not take into account the potential job creation from food waste reduction initiatives, as this would entail strong assumptions on new job profiles required. Based on data from surveys to stakeholders, JRC estimates the number of new jobs created respectively for options 1, 2 and 3 at: 6 700 heads 12 500 heads and 22 300 heads. The new jobs created included the roles such as: logistics operators in food banks, coaching supermarkets' staff as part of food redistribution initiatives, and collection/transport of products deriving from the valorisation of surplus food and by-products.

2.4.2. Income distribution

In all three options, the economy in the EU27 is only marginally affected. Calculating a standard measure for macroeconomic impacts, i.e., the value added at basic prices (output minus intermediate consumption), hereafter called "income", the EU27 shows a slight increase in net income of more than 2 billion EUR (0.022%) in option 3. Also, for the options 1 (0.8 billion EUR, 0.008%) and 2 (1.6 billion EUR, 0.016%), the overall economic impact is positive.

Food waste reduction, however, could lead to farm income losses due to less food wasted and hence lower resulting food demand. Figure 59 shows the change in farm income from primary agriculture for EU27 across policy options. In general income losses from the crops sector are higher than in the livestock sector due to the higher share of fruit, vegetables and cereals in total food waste. Option 1 leads to a decrease of around EUR 2.2 billion in farmers' income from crops and livestock farming, whereas in Option 3 this decrease is higher with EUR 7 billion, which corresponds to a decrease of 3.5%. The income in the total agri-food sector (including food processing but not including food services) could experience in the EU a limited decrease of about 3.6% in the most ambitious scenario (about 4.7% including food services).

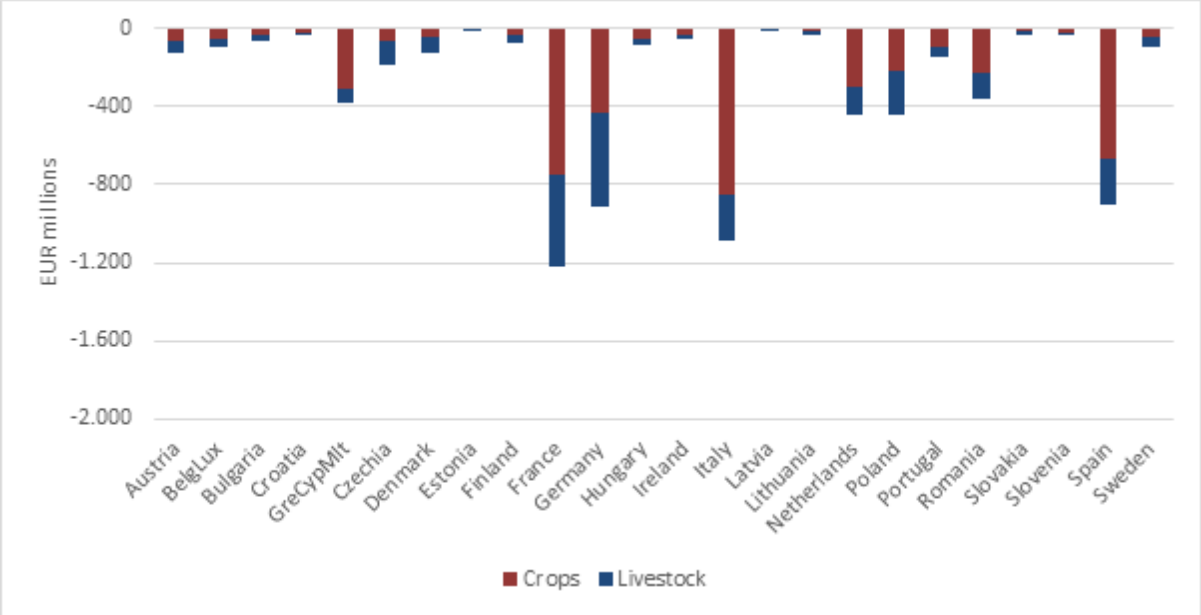
Figure 59: Change deviation in farm income (primary agriculture) EU27, options vs baseline 2030



Source: MAGNET simulation results

Figure 60 depicts the change in the farm income for the maximum target scenario, Option 3, with respect to the baseline at the Member State level. At the Member State level, we see differences where France, Germany and Italy show the highest losses in absolute terms. It should be noted that the losses in the food sector are in general compensated by additional income in non-food sectors.

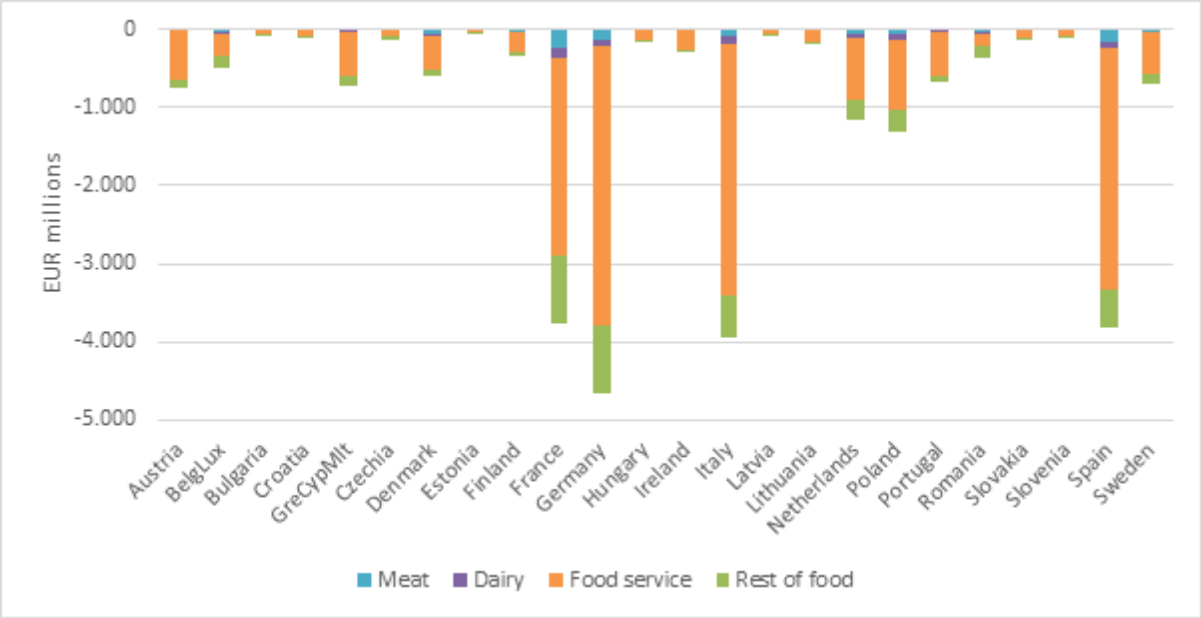
Figure 60: Change deviation in farm income (primary agriculture), Option 3 vs baseline 2030



Source: MAGNET simulation results

Regarding income changes for processed food and the food service sector, the highest income losses due to food waste reduction come from the food service sector (6% reduction at the EU level in Option 3). Figure 61 shows the change deviations per MS. Similarly to primary agriculture, the highest changes are observed in France, Germany, Italy and Spain.

Figure 61: Change deviation in income (food sector), advanced Option 3 vs baseline 2030



Source: MAGNET simulation results

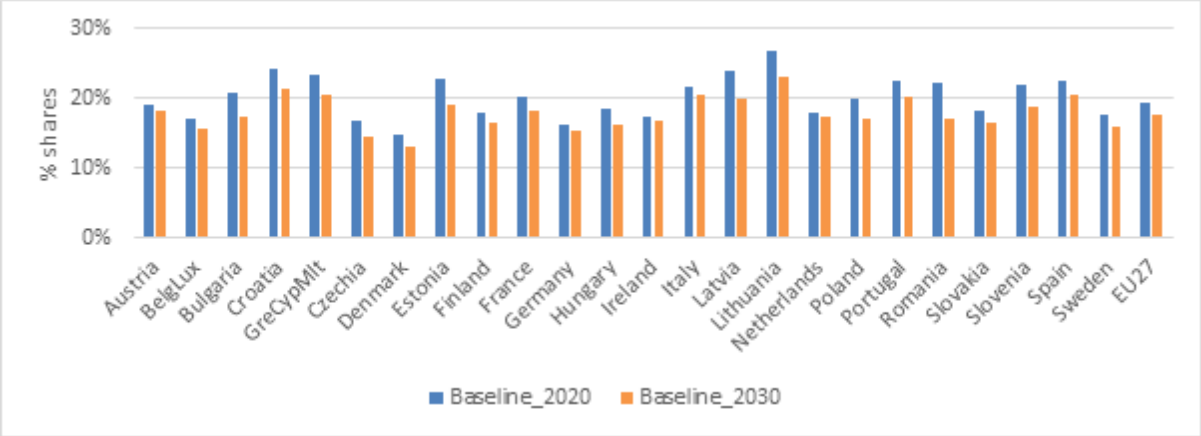
It should be noted that the model does not take into account possible developments in production systems and consumption habits[171] linked to the transition to sustainable food systems, which could trigger needs for new products and/or services (e.g., shift to organic

farming which generates higher income). For this reason, the numbers above should be treated rather as a worst-case scenario.

2.4.3. Food affordability

The average share of food expenditure (agri-food and food services) in total household expenditure in EU27 for 2020 is around 19%, which is projected to decrease by around 1.5 percentage points in 2030 in the baseline as depicted in Figure 62. This result is because as personal disposal incomes grow, non-food demands in developed societies grow faster than food demands (Engel's Law). The extent of this share differs across Member States, where typically those countries with lower per capita disposable incomes exhibit higher food budget shares.

Figure 62: Percentage share of food expenditure in total household expenditure, (Baseline 2020 and 2030)



Source: MAGNET simulation results

In all policy options examined, the share of food expenditure is expected to fall further, mostly because of decreased demand for food and linked food price reduction to it (Figure 63). Larger amounts of food waste reduction lead to higher decreases in food expenditure shares of households. Due to an expected decrease in food prices linked to food waste reduction, and the reduced amount of food (and food services) purchased, households could save, on average, from 220 to over 720 EUR per year (depending on target levels) and spend these amounts on higher quality food or other goods and services. Such savings are particularly relevant in the current context of rising food prices.

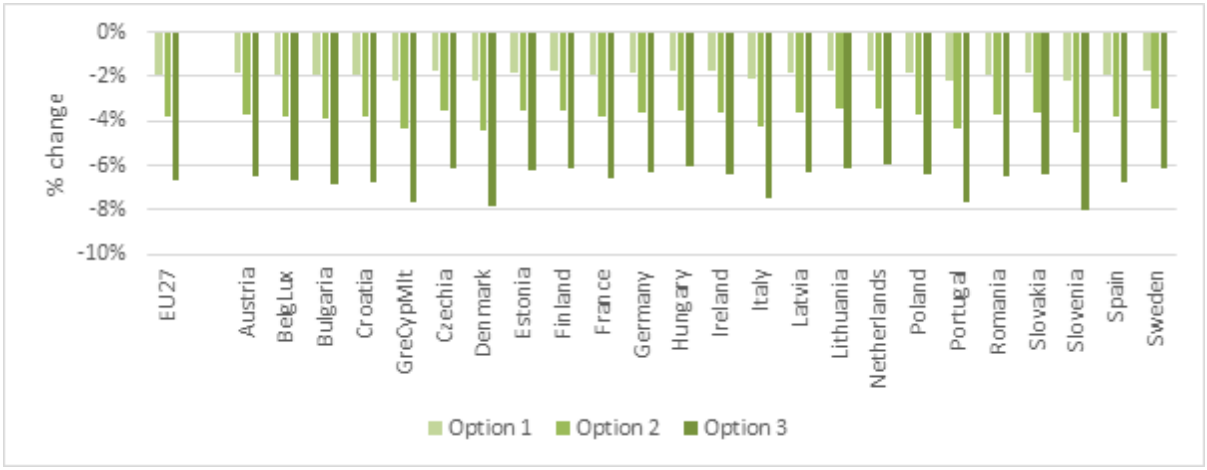
Figure 63: Food expenditure shares and percentage change deviations in food expenditure share, options vs baseline 2030



Source: MAGNET simulation results

Figure 67 shows the Member State-specific data for percentage change deviations in food expenditure. In nearly all EU27 countries, Option 3 results in a decrease of over 6%. Food expenditure shares decrease the most in Slovenia, Denmark and Bulgaria (around 8%).

Figure 64: Percentage change deviations in food expenditure share in total household expenditure, options vs baseline 2030



Source: MAGNET simulation results

2.5. Other impacts

2.5.1. SDGs

The Better Regulation TOOL #19. SUSTAINABLE DEVELOPMENT GOALS indicates: "The indicators and monitoring arrangements underpinning the SDGs can be used to describe the status quo policy objectives, expected impacts of policy options and the observed changes resulting from new policies. As such, the SDG framework is highly relevant for impact assessments and evaluations." It further outlines "the relevant SDGs should be identified and the associated indicators should be used (if available) when preparing the following sections of the impact assessment report" (page 151).

Among the proposed "Tools for the analysis of SDGs" the SDGs modelling tool aims to facilitate the use of models for sustainability assessment in the SDGs framework trough the identification of appropriate model(s) for the assessment of specific policy options. The tool provides the list of all the models run or developed by the Commission and included in the Modelling Inventory and Knowledge Management System (MIDAS) and their contribution to the SDGs (at goal target and indicator level). This tool offers a transparent mapping of how model outputs can be directly or indirectly linked to EU/UN SDGs indicators, therefore screening which models could be suitable to quantitatively evaluate the impacts of policy options on SDGs targets and indicators."

As shown in the related report "Modelling for Sustainable Development Goals (SDGs): Overview of JRC models", the MAGNET model is listed as one of the models with the broadest coverage of SDGs and its related indicators.

Indeed, over the last years, the MAGNET model has been further developed for this purpose and was selected by UN-DESA as one of the 16 outstanding SDG Good Practices across the world. The approach also features in the 2021 OECD/JRC report on "Spillovers and Transboundary Impacts of Public Policies". Several scientific articles witness the methodological developments and applications over a broad range of topics.

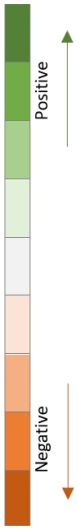
The figures Figure 65 (percentage changes in the three options) and Figure 66 (absolute changes) present a selection of direct or indirect SDG indicators as outcome of the MAGNET model.

The results of the bottom-up analysis can complement the assessment of the implications of the policy options on a number of relevant SDGs, as this analysis provides an assessment of the impact of the different policy options on additional environmental impact categories. The assessment allows to further evaluate four environmental impact categories of the Environmental Footprint (Commission Recommendation C(2021) 9332 final), which are connected to a number of SDGs (Sanye-Mengual and Sala, 2022). The approach also features in the 2021 OECD/JRC report on "Spillovers and Transboundary Impacts of Public Policies".

For the purpose of this exercise, to reduce the complexity of the assessment, the most relevant SDG was identified for each of the four environmental impact categories considered in this analysis. The outcome is presented in Figure 67 (percentage changes in the three options) and Figure 68 (absolute changes).

Figure 65: Percentage changes of selected direct or indirect SDG indicators

SDGs	Target indicators	Unit	Baseline (2030) vs. Baseline (2020), % change	Scenarios (2030) vs. Baseline (2030), % change			
				Option 1	Option 2	Option 3	
1 NO POVERTY	Per capita utility from private expenditure	Index	13.61%	-0.19%	-0.36%	-0.60%	P
	GDP per capita	EUROS (2014 prices)	18.71%	0.01%	0.03%	0.05%	
	Disposable income per capita	EUR 1 000 per capita (2014 prices)	15.89%	-0.10%	-0.19%	-0.30%	P
2 ZERO HUNGER	Domestic food, primary agriculture and fish production	Index	5.92%	-0.64%	-1.26%	-2.04%	I
	Food imports	Index	1.91%	-1.38%	-2.68%	-4.30%	N
	Food exports	Index	5.18%	0.05%	0.12%	0.19%	P
	Calories per capita per day ind fish	kcal/pc/pd	-0.75%	-1.52%	-2.93%	-4.67%	I
	Protein from livestock and fish products	protein qty/pc/pd	0.83%	-1.25%	-2.50%	-4.12%	I
	Food prices	Index	-6.72%	-0.31%	-0.61%	-0.99%	N
	Food consumption by region	Index	10.82%	-1.69%	-3.38%	-5.63%	I
4 QUALITY EDUCATION	Share of skilled labour	share value <=1	-0.35%	0.01%	0.02%	0.04%	P
7 AFFORDABLE AND CLEAN ENERGY	Share of energy from renewables	share value <=1	53.36%	-0.010%	-0.022%	-0.038%	P
	Energy price (fossils)	Index	24.02%	0.004%	0.009%	0.015%	N
	Ratio of value added (val $) to energy usage (val $) in food activities	ratio based on value concepts in data	-11.29%	-0.15%	-0.29%	-0.49%	P
	Final usage of energy commodities per unit of GDP	kilo tonnes of oil equivalent (ktoe) per dollar of GDP	-14.89%	0.04%	0.09%	0.17%	N
8 DECENT WORK AND ECONOMIC GROWTH	Agricultural employment growth ratio	Index	-5.02%	-0.04%	-0.09%	-0.14%	P
	Wages to labour (including output taxes) plus labour taxes divided by GDP	share value <=1	-0.71%	-0.02%	-0.05%	-0.09%	P
	Net trade (X-M)	EUR millions (2014 prices)	20.18%	-0.03%	-0.12%	-0.24%	I
	Share of value added food in total value added	share value <=2	-11.78%	-0.85%	-1.66%	-2.73%	N
	Annual growth in real GDP per worker	% change	386.23%	0.08%	0.17%	0.29%	P
9 INDUSTRY, INNOVATION AND INFRASTRUCTURE	CO2 emissions from livestock per unit of value added	tonnes per dollar	-9.88%	0.11%	0.25%	0.39%	N
	Total imports	volume	9.81%	-0.03%	-0.06%	-0.08%	N
	Total exports	volume	12.56%	-0.03%	-0.05%	-0.07%	P
10 REDUCED INEQUALITIES	Ratio of skilled to unskilled agric labour wages	Index	1.12%	0.08%	0.15%	0.24%	I
	PALMAEU Palma ratio (10% richest divided by 40% poorest)	Ratio	-0.22%	0.02%	0.03%	0.05%	N
11 SUSTAINABLE CITIES AND COMMUNITIES	ammonia	Giga grams	-1.46%	-0.46%	-0.91%	-1.50%	N
	nitrogen oxides	Giga grams	-4.58%	0.08%	0.16%	0.28%	N
	total air pollution	Giga grams	-0.46%	0.03%	0.07%	0.13%	N
12 RESPONSIBLE CONSUMPTION AND PRODUCTION	Emissions footprint ave per cap per year food direct and indirect flows	kgCo2e/pc/py	-3.61%	-1.19%	-2.36%	-3.88%	N
	land footprint ave per cap per year food final demands	m2/pc/py	-8.08%	-0.96%	-1.85%	-4.62%	N
	Food waste *(instead of the target, food loss index)*	000 tonnes	0.11%	-12.18%	-23.00%	-41.27%	N
13 CLIMATE ACTION	Tonnes of emissions (CO2e) per unit of GDP	tonnes CO2e per dollar	-14.59%	-0.06%	-0.13%	-0.21%	N
	Emissions virtual flow trade balance food final demands	MtCO2e	-14.82%	-2.21%	-4.36%	-7.10%	N
15 LIFE ON LAND	Agricultural land use	Land area in millions ha	-0.29%	-0.13%	-0.25%	-0.41%	N
	land virtual flow trade balance food final demands	Land area in millions ha	-9.57%	-1.43%	-2.78%	-4.39%	N



Source: MAGNET simulation results

Figure 66: Absolute changes of selected direct or indirect SDG indicators

SDGs	Target indicators	Unit	2020	Baseline 2030, abs. value	Scenarios (2030) vs. Baseline (2030), absolute change Option 1	Option 2	Option 3
1 NO POVERTY	Per capita utility from private expenditure	Index	100	113.61	113.39	113.20	112.93
	GDP per capita	EUROS (2014 prices)	26.40	31.34	31.35	31.35	31.36
	Disposable income per capita	EUR 1 000 per capita (2014 prices)	14 932.40	17 305.73	17 288.77	17 273.06	17 253.58
2 ZERO HUNGER	Domestic food, primary agriculture and fish production	Index	100	105.92	105.24	104.59	103.76
	Food imports	Index	100	101.91	100.51	99.18	97.53
	Food exports	Index	100	105.18	105.24	105.30	105.38
	Calories per capita per day incl fish	kcal/pc/pd	2 609.09	2 589.61	2 550.18	2 513.61	2 468.76
	Protein from livestock and fish products	protein qty/pc/pd	45.86	46.25	45.67	45.09	44.34
	Food prices	Index	100	93.28	93.00	92.71	92.36
	Food consumption by region	Index	100	110.82	108.95	107.08	104.58
4 QUALITY EDUCATION	Share of skilled labour	share value <=1	0.4727	0.4711	0.4711	0.4712	0.4713
7 AFFORDABLE AND CLEAN ENERGY	Share of energy from renewables	share value <=1	0.07	0.11	0.11	0.11	0.11
	Energy price (fossils)	Index	100	124.02	124.03	124.03	124.04
	Ratio of value added (val $) to energy usage (val $) in food activities	ratio based on value concepts in data	15.61	13.84	13.82	13.80	13.78
	Final usage of energy commodities per unit of GDP	Mio tonnes of oil equivalent (ktoe) per dollar of GDP	0.1816	0.1546	0.1547	0.1547	0.1549
8 DECENT WORK AND ECONOMIC GROWTH	Agricultural employment growth ratio	Index	1 173.22	1 114.36	1 113.87	1 113.39	1 112.81
	Wages to labour (including output taxes) plus labour taxes divided by GDP	share value <=1	0.35761	0.35505	0.35497	0.35488	0.35474
	Net trade (X-M)	EUR millions (2014 prices)	113 002.14	135 807.72	135 763.87	135 644.75	135 482.20
	Share of value added food in total value added	share value <=2	0.02292	0.02022	0.02005	0.01989	0.01967
	Annual growth in real GDP per worker	% change	0.00356	0.01730	0.01731	0.01733	0.01735
9 INDUSTRY, INNOVATION AND INFRASTRUCTURE	CO2 emissions from livestock per unit of value added	tonnes per dollar	77.51	69.85	69.93	70.02	70.12
	Total imports	volume	6 399 131.50	7 027 175.50	7 024 966.00	7 023 183.00	7 021 325.00
	Total exports	volume	6 086 354.50	6 850 965.50	6 849 124.50	6 847 631.50	6 846 167.50
10 REDUCED INEQUALITIES	Ratio of skilled to unskilled agric labour wages	Index	100	101.12	101.20	101.27	101.36
	PALMAEU Palma ratio (10% richest divided by 40% poorest)	Ratio	1.1067	1.1043	1.1045	1.1046	1.1048
11 SUSTAINABLE CITIES AND COMMUNITIES	ammonia	Giga grams	5 119.95	5 045.26	5 021.98	4 999.28	4 969.80
	nitrogen oxides	Giga grams	14 248.64	13 595.78	13 606.13	13 617.48	13 633.82
	total air pollution	Giga grams	4 656.28	4 634.68	4 636.27	4 638.11	4 640.81
12 RESPONSIBLE CONSUMPTION AND PRODUCTION	Emissions footprint ave per cap per year food direct and indirect flows	kgCo2e/pc/py	1 517.71	1 462.89	1 445.48	1 428.40	1 406.07
	land footprint ave per cap per year food final demands	m2/pc/py	3 007.91	2 764.77	2 738.35	2 713.71	2 637.07
	Food waste *(instead of the target, food loss index)*	000 tonnes	56 980.80	57 044.63	50 096.89	43 926.14	33 503.97
13 CLIMATE ACTION	Tonnes of emissions (CO2e) per unit of GDP	tonnes CO2e per dollar	249.66	213.24	213.11	212.97	212.80
	Emissions virtual flow trade balance food final demands	MtCO2e	69.20	58.94	57.64	56.37	54.75
15 LIFE ON LAND	Agricultural land use	Land area in millions ha	157.54	157.08	156.88	156.68	156.43
	land virtual flow trade balance food final demands	Land area in millions ha	33.23	30.05	29.62	29.21	28.73

Source: MAGNET simulation results

Figure 67: Percentage changes of selected direct or indirect SDG indicators

SDGs	Target indicators	Unit	Baseline (2030) vs. Baseline (2020), % change	Scenarios (2030) vs. Baseline (2030), % change Option 1	Option 2	Option 3
6 CLEAN WATER AND SANITATION	Food waste impacts on water use (EF)	Billion m3 water eq	-0.72%	-14%	-25%	-44%
13 CLIMATE ACTION	Food waste impacts on climate change (EF)	MtCO2eq	-0.69%	-14%	-26%	-44%
14 LIFE BELOW WATER	Food waste impacts on marine eutrophication (EF)	Million kg N eq	-0.94%	-14%	-26%	-45%
15 LIFE ON LAND	Food waste impacts on land use (EF)	Trillion Pt	-0.70%	-13%	-24%	-42%

Source: Bottom-up analysis

Figure 68: Absolute changes of selected direct or indirect SDG indicators

SDGs	Target indicators	Unit	2020	Baseline 2030, abs. value	Scenarios (2030) vs. Baseline (2030), absolute change		
					Option 1	Option 2	Option 3
6	Food waste impacts on water use (EF)	Billion m3 water eq	333.98	331.66	288.80	251.57	190.77
13	Food waste impacts on climate change (EF)	MtCO2eq	245.93	244.17	211.02	182.14	136.34
14	Food waste impacts on marine eutrophication (EF)	Million kg N eq	2,088.17	2,068.52	1,785.36	1,536.51	1,146.61
15	Food waste impacts on land use (EF)	Trillion Pt	8.51	8.45	7.29	6.29	4.69

Source: Bottom-up analysis

2.5.2. Territorial impacts

The MAGNET model does not provide results for subnational geographical units. However, a preliminary assessment of the potential territorial impacts of the food waste reduction targets can be performed considering the differences in the production structure at the regional level. Thus, we can assume that those regions whose production structure includes most affected sectors by the food waste reduction objectives, will be also the most exposed to the overall economic impact.

In this section we analyse the potential impacts of food waste reduction in the advanced target scenario over regional employment. For this exercise, we focused on some selected sectors that would be the most affected by the food waste reduction according to the aforementioned scenario: (1) agriculture (2) food manufacturing and (3) waste collection. We also analysed both the manufacturing and service sectors (the latter only for value added) so as to have a holistic perspective of the economy. For each sector, we retrieved data on both regional employment (number of persons employed by NUTS2 regions) and value added (million euros) from Eurostat data sources (Regional Accounts and Structural Business Statistics).

The year 2019 is selected as the reference given that it is the most recent year not affected by the COVID-19 pandemic for which both datasets have data availability. Regional accounts provide information until the year 2021, while Structural Business Statistics recently published the data for 2020. However, some sectors such as the accommodation and food services activities were strongly affected by lockdowns and other measures to mitigate the pandemic. Consequently, the information on these years may be distorted with regard to both recent and projected trends in MAGNET even though the effects of the COVID-19 shock was already considered in the baseline scenario.

Table 39: Selected indicators and data sources

Indicator	Data sources	Sector	NACE code
Number of persons employed	Regional Economic Accounts (nama_10r_3empers)	Agriculture	A01
		Manufacturing	C (excl. C10)
		Services (including Accommodation and Food services)	F, G-J, K-N, O-U

	Structural Business Statistics (sbs_r_nuts06_r2)	Food Manufacturing	C10
		Waste Collection	E38
Value Added	Regional Economic Accounts (nama_10r_3gva)	Agriculture	A01
		Manufacturing	C (excl. C10)
		Services (excluding Accommodation and Food services)	F, G, H, J, K-N, O-U
	Structural Business Statistics (sbs_r_nuts06_r2)	Food Manufacturing	C10
		Waste Collection	E38
		Accommodation and Food services	I

Source: Authors' own elaboration

After some processing and consistency checks[155], the data from Eurostat were used to calculate the share of both regional employment and value added over the total for each sector per country. Then, these shares were used as a criterion to distribute the foreseen deviations by country among the corresponding NUTS2. The results are described below.

Table 40 and Table 41 show a general overview of the impact of food waste reduction by NUTS2 regions classified according to their level of development. This classification follows the same criteria as the eligibility to receive European Regional Development Funds. Thus, the less developed regions are those whose GDP per capita is below 75% of the EU average, the transition regions show a GDP per capita between 75% and 100% of the EU average, while the most developed regions present a GDP per capita above 100% of the EU average.

Table 40 - Potential impact on total regional employment by group of regions according to their level of development

	Agriculture	Food Manufacturing	Waste Collection	Manufacturing (excl. food-related activities)
Less developed	-0.14%	-0.03%	-0.03%	0.03%
Transition	-0.07%	-0.03%	-0.02%	0.01%
Most Developed	-0.04%	-0.03%	-0.01%	0.02%

Source: Own elaboration from MAGNET results and Eurostat data.

Table 41 - Potential impact on total regional value added by group of regions

	Agriculture	Food Manufacturing	Waste Collection	Manufacturing (excl. Food-related	Services

155 The regional data processing is conducted following the methodology described in Lasarte-López. J. et al., 2022 https://publications.jrc.ec.europa.eu/repository/handle/JRC128984

				activities)	
Less developed regions	-0.18%	-0.09%	-0.03%	0.05%	0.13%
Transition regions	-0.10%	-0.08%	-0.01%	0.01%	0.24%
Most Developed regions	-0.04%	-0.05%	-0.01%	0.02%	0.14%

Source: Own elaboration from MAGNET results and Eurostat data.

In general, we can identify that the impact on agriculture and waste collection sectors could be relatively higher in the less developed regions in terms of both employment and value added. The effect would be lower in the most developed ones. Regarding food manufacturing, there are no significant differences among the three regional groups in terms of employment. As for value added, the most developed regions could register a smaller impact. The rest of the manufacturing activities would partially compensate these negative effects on both employment and value added, especially in the less developed group of regions.

As indicated in previous sections the positive impact in service sectors would partially compensate the negative effects of food waste reduction on value added from food-related activities. According to our estimates, the transition regions would be most benefitting by the positive impact on the services sector. This may be explained by the higher relative weight of tertiary activities over their GDP. By contrast, the positive effect of services would be less significant for the less developed group of regions.

Figure 69 shows the relative decreases of both the agricultural employment and value added over the total regional economy. From the analysis of this figure, we can identify the following insights.

In terms of employment, the most affected regions are concentrated in Eastern Europe (mainly in Poland and in Bulgaria) as well as in Greece. This is explained by the high share of jobs depending on the primary sectors in these regions. Within Western Europe, the most affected areas would be most regions in France and Austria and some regions in Central and Southern Spain, as well as in Southern Italy.

The territorial distribution of the impact on the agricultural value added is quite similar. However, the impact would be more homogenous when comparing both Western and Eastern group of regions. This may suggest higher labour productivity gains in the latter group.

Figure 70 represents the potential impact on the food manufacturing. Contrary to agriculture, the regions with higher job losses in the food manufacturing sector due to the food waste reduction would be mainly located in Western Europe. Specifically, regions in Central Spain, Western France and across Germany would suffer the highest decreases in the number of persons employed in this sector. In addition, Croatian regions would be also highly affected. Other geographical areas with moderate potential impacts would be located in Italy, Greece and in Poland (surroundings of Warsaw). Concerning value added, the effects of reducing food waste on this sector would follow a similar regional distribution but with a more homogeneous impact in Eastern and Western regions.

The potential impacts of food waste reduction targets in the waste collection sector are shown in Figure 71. The main insights from this sector are described below.

Latvia would register the highest impact on the employment generated by this sector. As the entire country is considered as a NUTS2 territorial unit, no regional differentiations can be

identified within this country. Other regions moderately affected by a reduction in the number of persons employed in the waste collection sector are in Portugal, Italy (Southern regions) and Romania (specially the capital region Bucharest).

In terms of value added, the territorial distribution of the impact of food waste reduction would follow a pattern similar to that of employment except for Portugal, which shows a higher relative decrease for this variable.

The territorial distribution of the impacts on the manufacturing sector (excluding food manufacturing) is depicted in Figure 72. The positive effect on manufacturing employment will be reflected in northern Spain (which concentrates the most industrialized regions within the country), some regions in Romania and, to a lesser extent, areas from the rest of Eastern countries, Germany and Italy. As for value added, the distribution of the most affected areas is similar. However, the most positive effects are concentrated in Poland and Romania.

Figure 73 illustrates the potential positive impact of reducing food waste on value added from the service sector. In general, the performance of this sector at the regional level seems to be highly driven by the national-level effect of food waste reduction. In addition, a net positive impact is observed in this sector, which could reach 1.0% of value added for some regions. However, we can still identify some 'hot spots' registering negative impacts, many of which are located in coastal and/or touristic areas. This may be a result of the high importance of accommodation and food service activities in those areas. The most negatively affected regions are concentrated in Greece (mainly in the islands) and Portugal (specifically the most southern region, Algarve could be highly affected). Other areas with moderate potential negative impact are located in Italy and Austria (Tyrolean regions), Spain (island regions) and Poland.

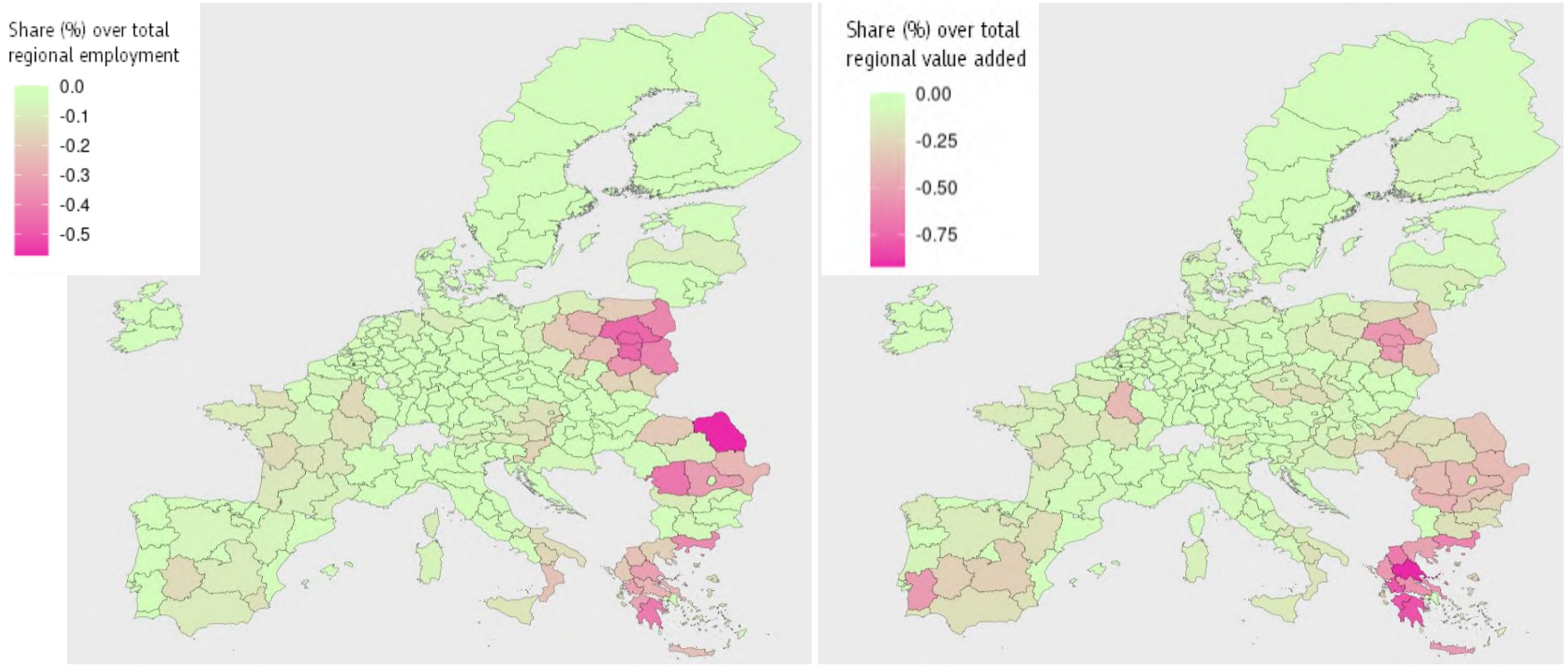
Figure 74 shows the potential losses in value added from the most negatively affected regions (share of GDP), while Figure 75 shows potential value added gains in the most positively affected ones.

In general, the regions with higher potential decreases in value added correspond to Southern and Eastern countries. The losses in the five potentially most affected regions are explained by sharp declines in the services sectors probably driven by the high importance of the accommodation and food service activities (four out of five are coastal touristic areas). In the rest of the displayed regions, the agriculture and the food manufacturing are the main sectors explaining the decline in total value added.

The most positively affected regions belong to France (6 regions), continental Greece (4 regions), and, to a lesser extent, Portugal (2 regions), Spain (2 regions), Belgium (2 regions) and Croatia (1 region). In general, many of these regions show a high importance of the service sectors (five of them are capital regions of the mentioned countries). Therefore, they would be the ones to benefit most from the overall positive effect in this sector.

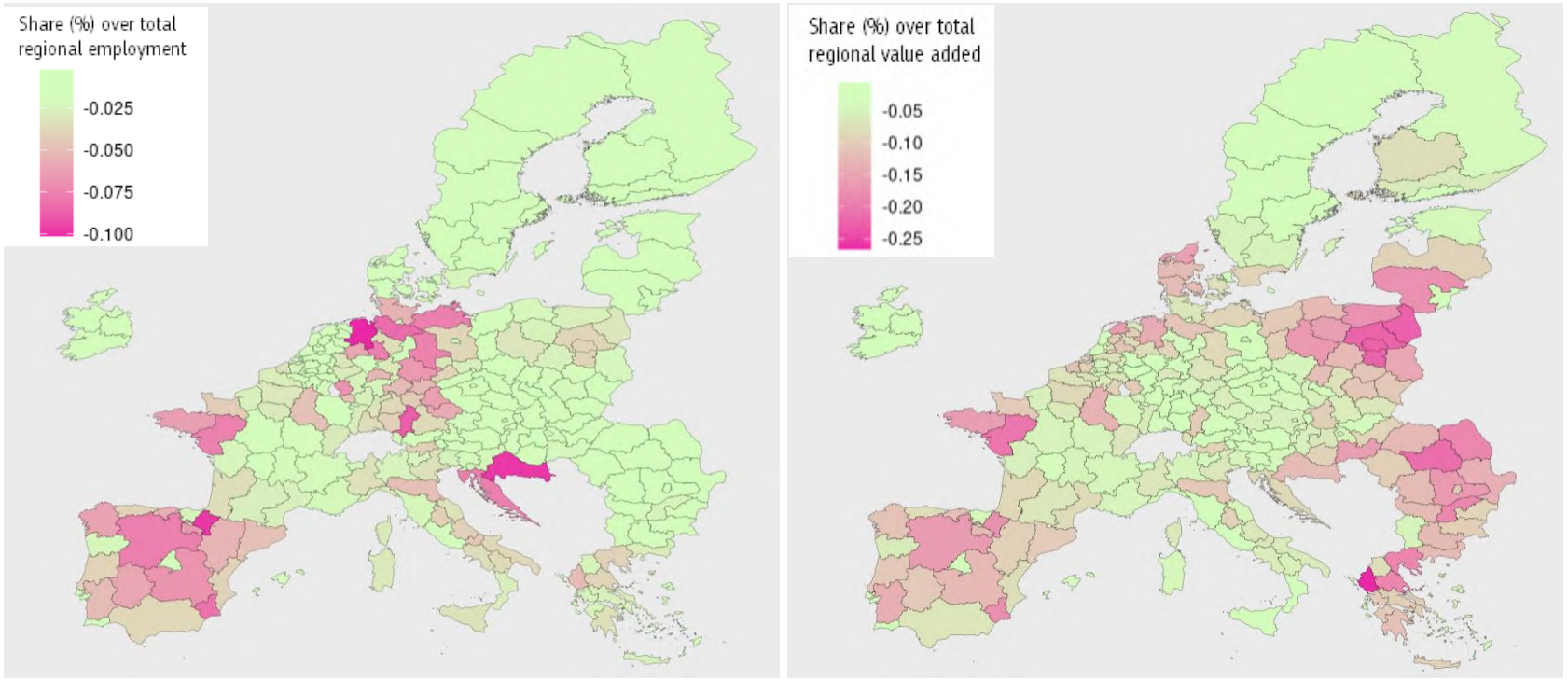
As mentioned, the results reflected in this section assume that the impact of food waste reduction by sectors would suffer an equal shock in all regions within a country. Thus, the regional differences would be explained by the weight of each of the four analysed sectors in the sectoral composition of regional employment. Consequently, the obtained results should not be considered as regional job losses per se but as an indicator reflecting the degree of exposure of regional employment to the fulfilment of the food waste reduction objectives in the advanced target scenario.

Figure 69: Regional impact on agriculture sector. Percentage of deviation over total employment (left) and value added (right) in baseline by NUTS2



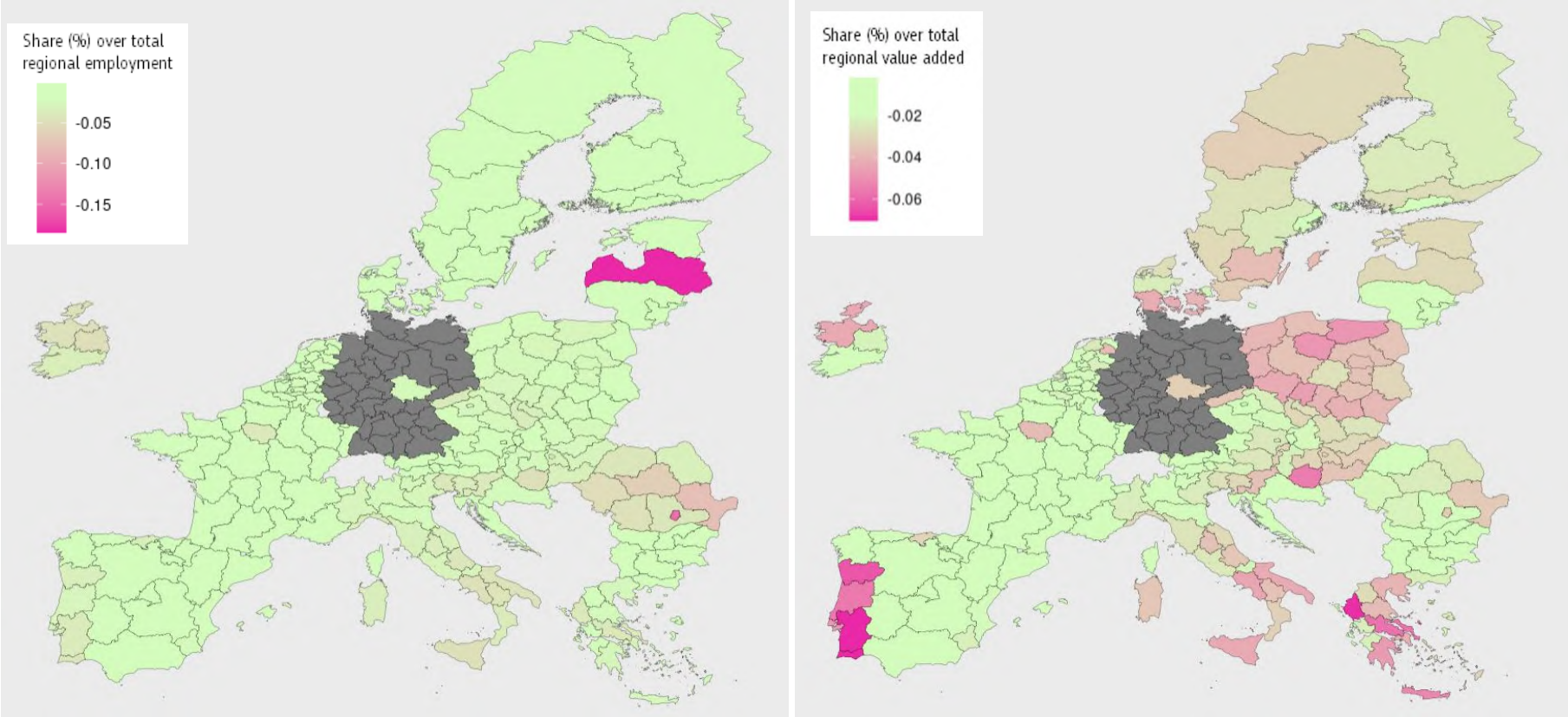
Source: Authors' own elaboration from MAGNET results and Eurostat data

Figure 70: Regional impact on the food manufacturing. Percentage of deviation over total employment (left) and value added (right) in baseline by NUTS2



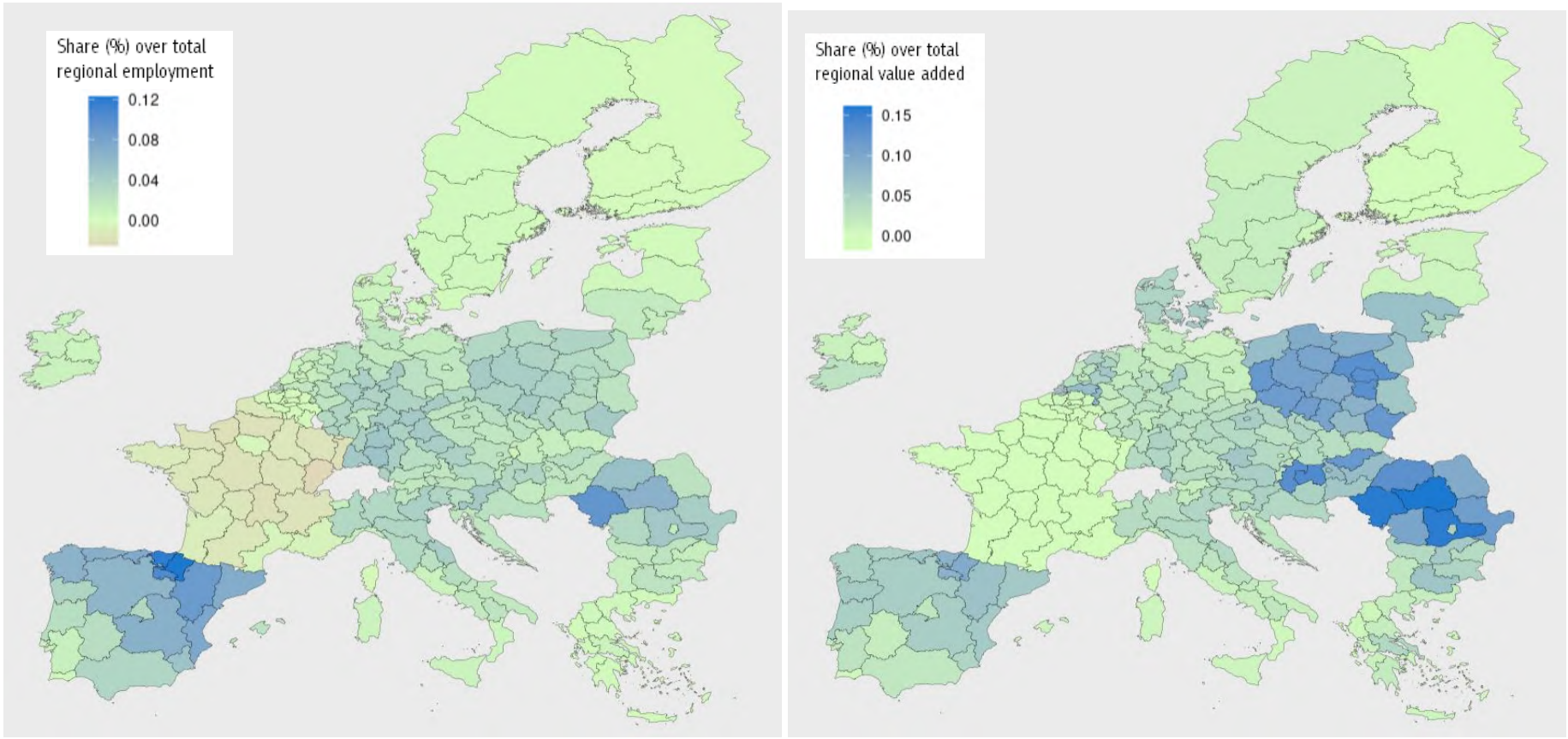
Source: Authors' own elaboration from MAGNET results and Eurostat data

Figure 71: Regional impact on the Waste Collection. Percentage of deviation over total employment (left) and value added (right) in baseline by NUTS2



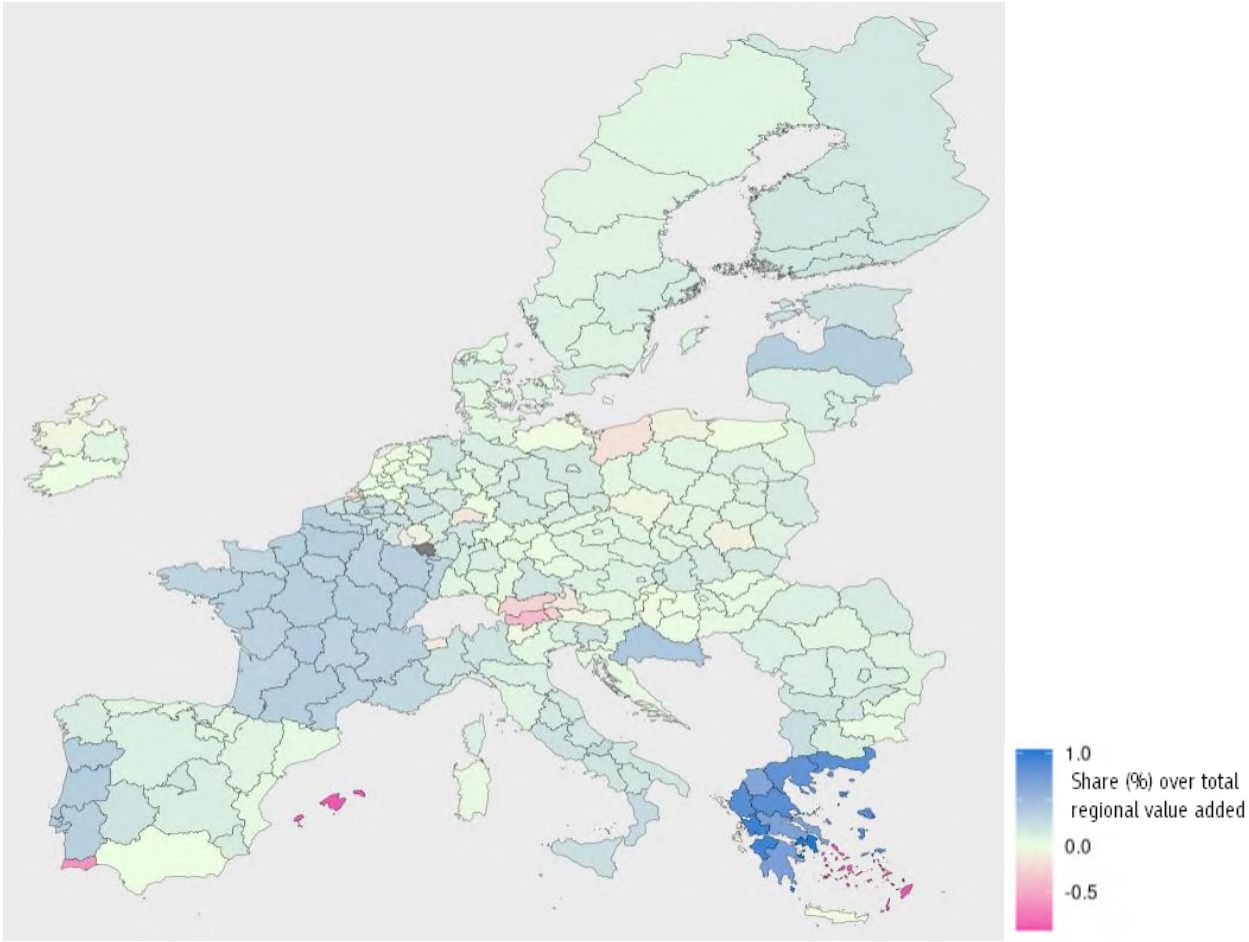
Source: Authors' own elaboration from MAGNET results and Eurostat data

Figure 72: Regional impact on Manufactures (excluding food manufacturing). Percentage of deviation over total employment (left) and value added (right) in baseline by NUTS2



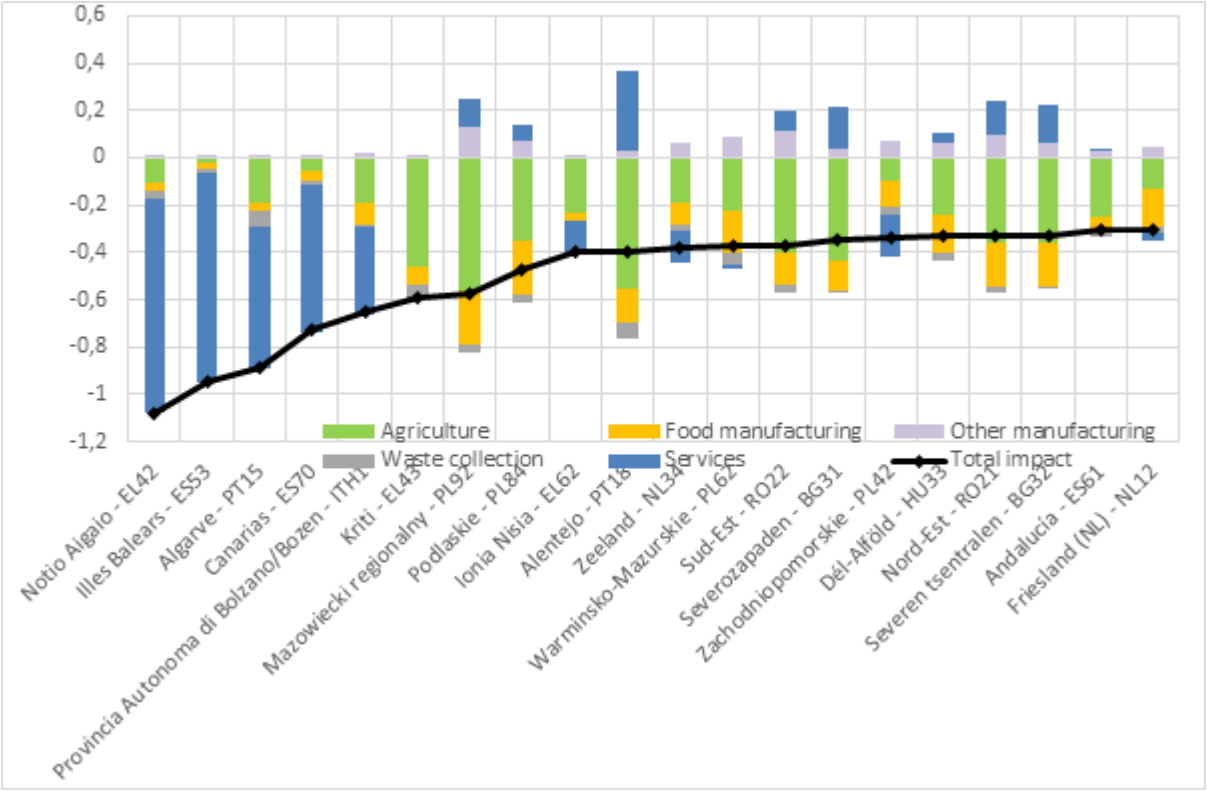
Source: Authors' own elaboration from MAGNET results and Eurostat data

Figure 73: Regional impact on Services (including Accommodation and Food services activities). Percentage of deviation over total value added (right) in baseline by NUTS2



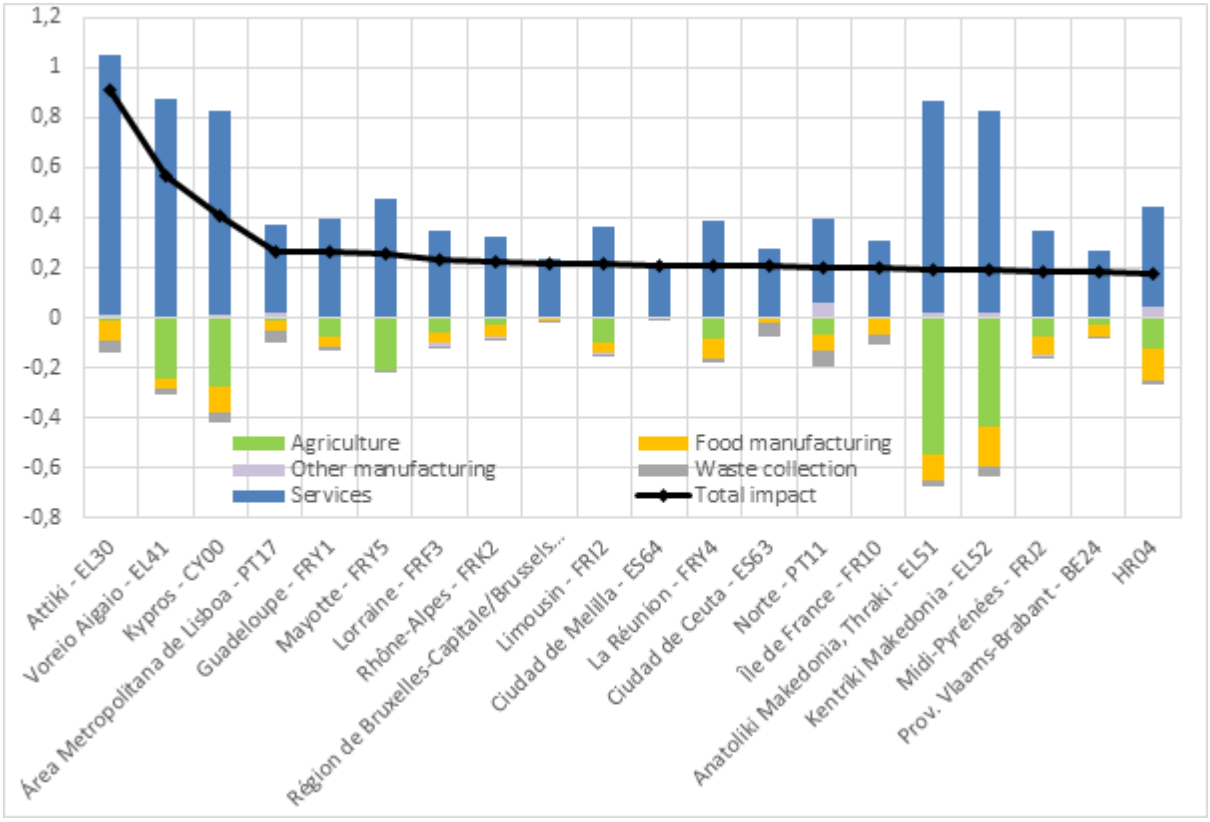
Source: Authors' own elaboration from MAGNET results and Eurostat data

Figure 74: Potential impact on value added for most negatively affected regions (share over total value added)



Source: Authors' own elaboration from MAGNET results and Eurostat data

Figure 75: Potential impact on value added for most positively affected regions (share over total value added)



Source: Authors' own elaboration from MAGNET results and Eurostat data

2.5.3. Impact on SMEs

Recent decades have witnessed an increasing awareness of the importance of small and medium-sized enterprises (SMEs). In fact, although some economists still claim that the role of the SMEs is underestimated (e.g., Ipinnaiye et al 2017), others are arguing that SMEs are already in the vanguard of the industrial policy agenda (e.g., Rigtering et al 2014). According to the World Bank, SMEs constitute over 90% of all businesses and employ over 50% worldwide. The above shares are even higher in the case of the European Union. Following the EUROSTAT data in 2020, the share of SMEs in the overall number of firms included in non-financial business economy stand around 99.8%. Their share in employment was close to 65%, while the value added created by SMEs reached over 52%.

Traditionally, factors related to firm characteristics, internal firm strategy and external financing were considered as main drivers of the SMEs growth (e.g., Barba Navaretti et al 2014; Demirel and Danisman 2019; Mazzucato and Parris 2015). However, recently more interest was placed on the impact of overall macroeconomic conditions. This is due to the fact that SMEs are over-represented in several economic sectors that tend to be particularly exposed during economic crises (OECD 2021). Moreover, financial constraints make SMEs be more vulnerable to the evolution of the macroeconomic environment (e.g., Christopherson 2015; Lai et al 2016).

Existing analyses indicate that macroeconomic factors influence both SMEs' turnover and employment. In particular, Ipinnaiye et al. (2017) show that, in the case of the Irish

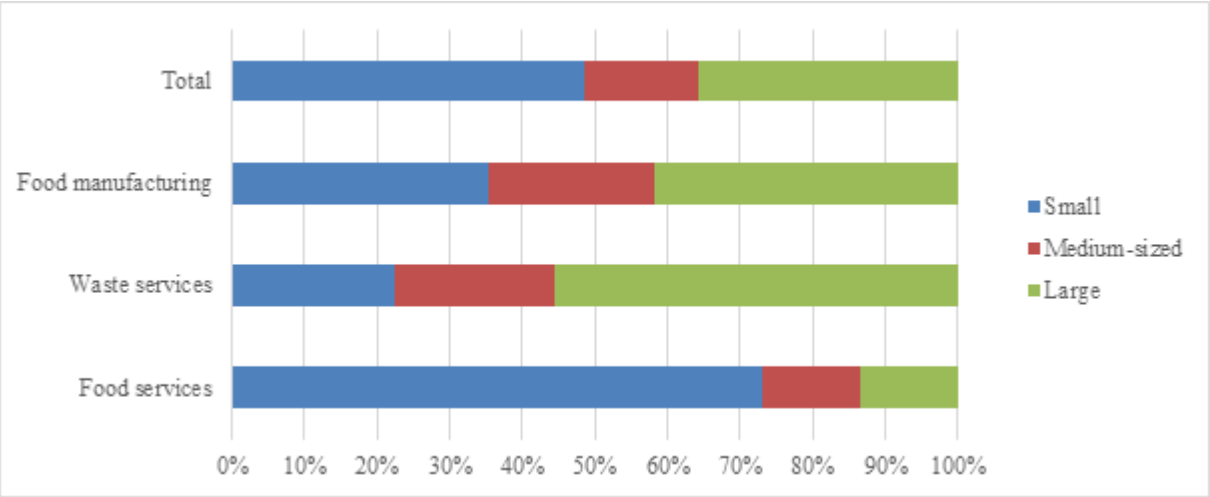
manufacturing sector, a 1% increase in inflation rate leads to a 2% rise in the turnover growth. Their findings are in line with earlier publications by Beck et al. (2005) or Mateev and Anastasov (2011). At the same time, however, an increase in inflation leads to a decrease in employment. Ipinnaiye et al. (2017) also report a strong positive correlation between the industry growth and both SMEs' turnover and employment growth. In the case of the former, the elasticity is around 22%, while in the case of the latte,r it is around 4%. Still other publications show a much weaker impact of GDP growth and firms' growth. Here the estimated elasticity oscillates between 2% and 4% (e.g., Beck et al 2005; Mateev and Anastasov 2011).

The results of simulations done with the MAGNET model within the Food Waste Impact Assessment project show that the most negatively affected industries would be agriculture, food manufacturing, waste collection and treatment and food services. The abovementioned industries would face the highest decrease both in the value of production and employment. Still, in the case of the former, the highest ambition target reveals that the cumulative growth of the value of production between 2020 and 2030 would be lower by around 2 percentage points in the case of agriculture, over 3 percentage points for food manufacturing, and around 13 percentage points for waste services. In the case of employment, the total decrease for the whole EU is hard to estimate due to the peculiarity of the food service industry and the fact that the SMEs employment in food services is quite high (over 9 million in the EU27). Note that, on average, all the remaining industries would experience a positive impact of food waste reduction. Although the cumulative difference would be very small. For instance, it would be less than 1 percentage point in the case of the production value and less than 0.5 million in the case of employment.

The growth in value of production can be considered as a proxy for the GDP growth in the aforementioned empirical papers. Therefore, taking into account the lower values of elasticities reported in the existing studies, we could expect a moderate decrease in SMEs growth in food manufacturing (at least 7 percentage points), about 15 percentage points for food services and over 25 percentage points for waste services. Also, the change in prices would further negatively impact waste services (additional decrease in turnover growth by 2 percentage points). At the same time however, higher inflation should increase turnover in the food service sector.

The above estimates rely on the average elasticities calculated for the entire economy. Nevertheless, the relative importance of SMEs can be different in particular sectors. EUROSTAT data on non-financial business economy allows comparing the share of SMEs in food manufacturing waste services and food services. Figure 76 below depicts the share of SMEs in the employment of the abovementioned industries in the EU27. It appears that this share is much higher than the average for the entire economy in the case of food services. As a result, we may assume that a decrease in employment caused by food waste reduction would particularly affect the SMEs in this sector. At the same time however, the employment share of SMEs is much lower for the waste services and somewhat lower for food manufacturing. Hence, the expected impact on the SMEs' employment in the above industries would be rather small. In fact, if we assume a constant share of SMEs in overall employment, we may estimate that the food waste reduction would lower SMEs' employment in food manufacturing by 35 000 thousand and in waste services by 21 000.

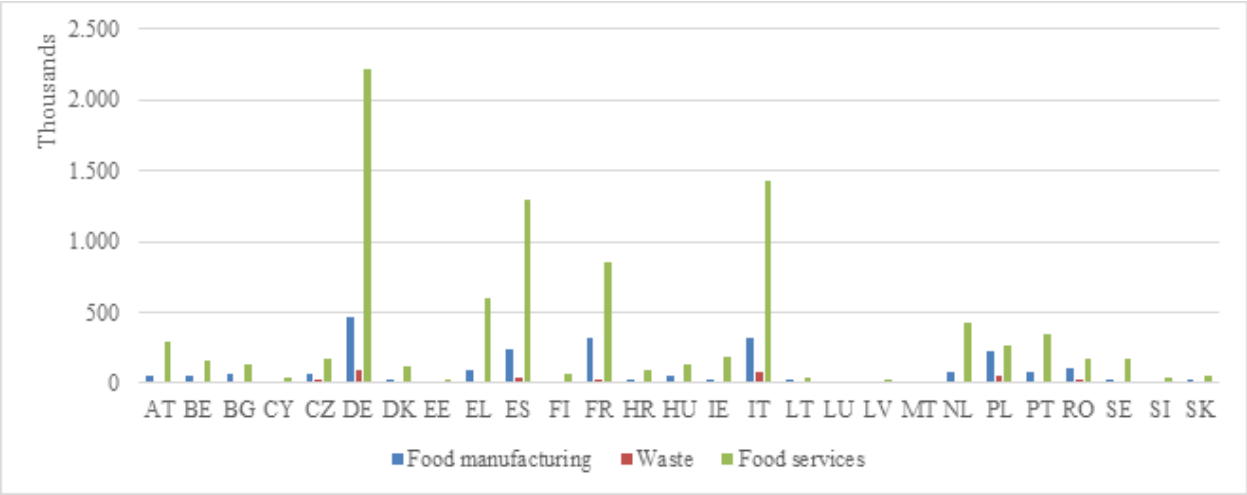
Figure 76: Employment by enterprise size EU27



Source: Authors' own elaboration from MAGNET results and Eurostat data

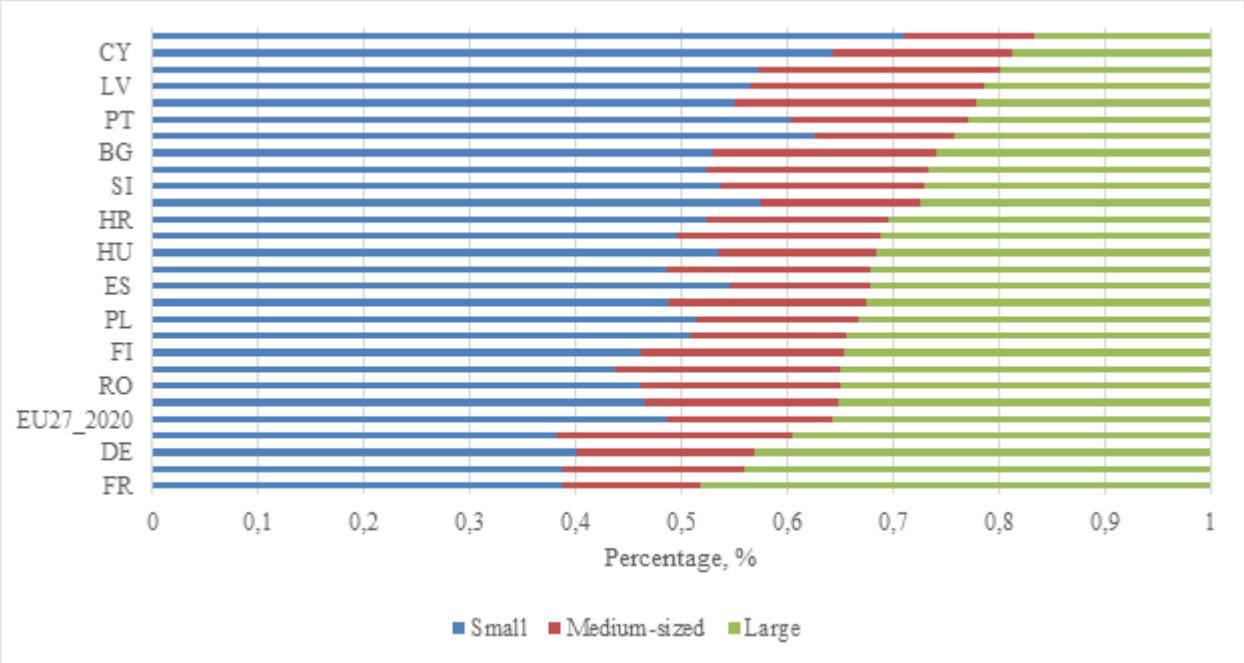
EUROSTAT data show also that there are significant differences in the share of SMEs sector among particular Member States. For instance, employment share of SMEs is much higher in smaller member states (e.g., Cyprus, Estonia, Malta and Latvia) than the bigger ones (e.g., France and Germany). This can be observed in Figure 77 below. On the other hand, these are the biggest member states that lead the SMEs employment in absolute terms (Figure 78). Consequently, we should expect a certain heterogeneity in the impact of food waste reduction on SMEs in particular countries. Following the assumption on a constant share of SMEs in overall employment, we may estimate that the highest reduction in SMEs employment of the analysed industries (without food services) would be expected in Germany (over 13 thousand), followed by Italy (almost 10 thousand) and Spain (over 6 thousand). In absolute numbers the negative impact on SMEs employment would be hardly observed in Denmark, Estonia, Lithuania or Slovenia with reduction far below 1000. Still the relative importance of the fall in employment could be even greater than elsewhere given the high share of SMEs employment in their economies (with the exception of Luxembourg).

Figure 77: SMEs employment in food manufacturing waste and food services by member state in 2020



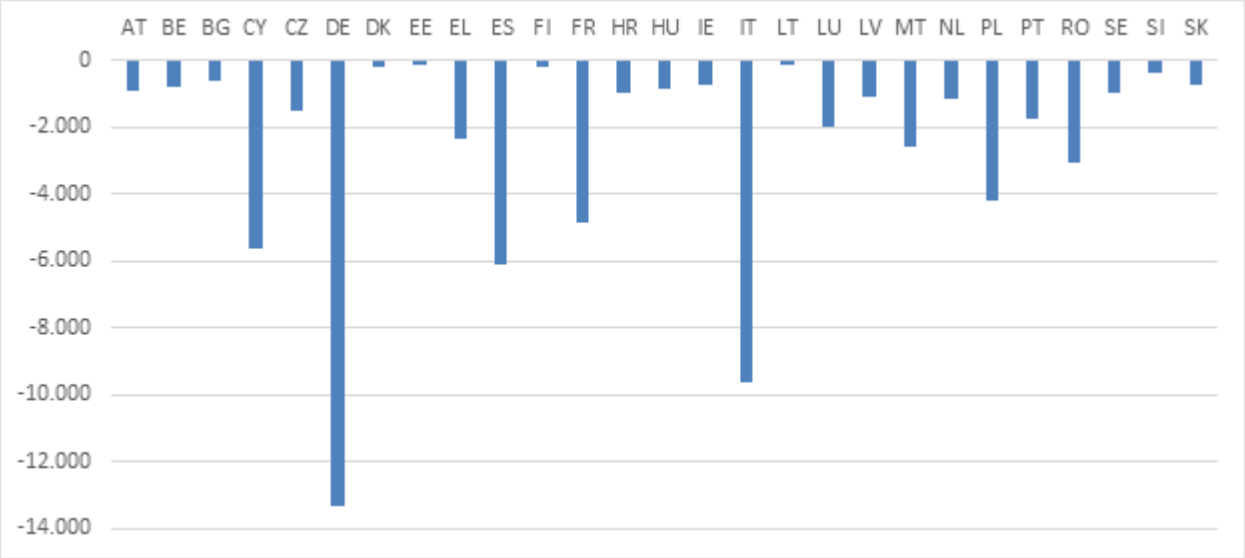
Source: Authors' own elaboration from Eurostat data

Figure 78: Share of SMEs employment in total employment by member state



Source: Authors' own elaboration from Eurostat data

Figure 79: Reduction in SMEs employment in food manufacturing and waste services by member state



Source: Authors' own elaboration from MAGNET results and Eurostat data

2.5.4. Bioeconomy and innovation

The food waste hierarchy defines options to tackle food waste inefficiencies. Prevention and redistribution of surplus food for human consumption are the most preferable options followed by the reuse in animal feed and revalorisation in added-value products keeping the high value of molecule bonds of the material. Low added-value uses such as composting and anaerobic digestion as well as incineration with energy recovery are still better options than disposal. In particular, the non-edible fraction of food that becomes waste can and should be valorised by activities of existing and new bio-based value chains. Already anticipated by the Circular Economy Action Plan and the Bioeconomy Strategy, the latest geopolitical developments and subsequent interruptions of supply chains gave an additional impetus to launch several new initiatives of the European Commission to increase the strategic autonomy for energy (EC, 2022, e.g. REPower EU action plan, where the focus is on sustainably produced biogas and methane, to some extent biofuels), fertilizer (EC, 2022), and other bio-based products.

Although the analysed scenarios in this study mainly look at the implications of food waste prevention and reuse, in principle, an important part of food waste, especially the non-edible fraction of food that is discarded can be valorised. The modelling results of the present assessment give some insights in line with the scenario design.

The reduction of food demand frees up land, which can be used for other purposes. Due to the scenario set-up and assumed cost/benefit relations for the different commodities, the main reaction is an increased export of food products and a small growth of first-generation biofuel production (less than 1% in the advanced scenario) within the existing mandate of the renewable energy directive. Concomitantly, a smaller number of new jobs are created in the related sectors.

As an outcome of the implemented policy options, food waste availability is reduced, so that in this scenario setting neither additional food waste is provided for industrial purposes nor its use promoted through specific policies (such as it is the case for biofuels). For this reason, an

additional uptake of second-generation biofuels and the bio-based industry in general is not observed.

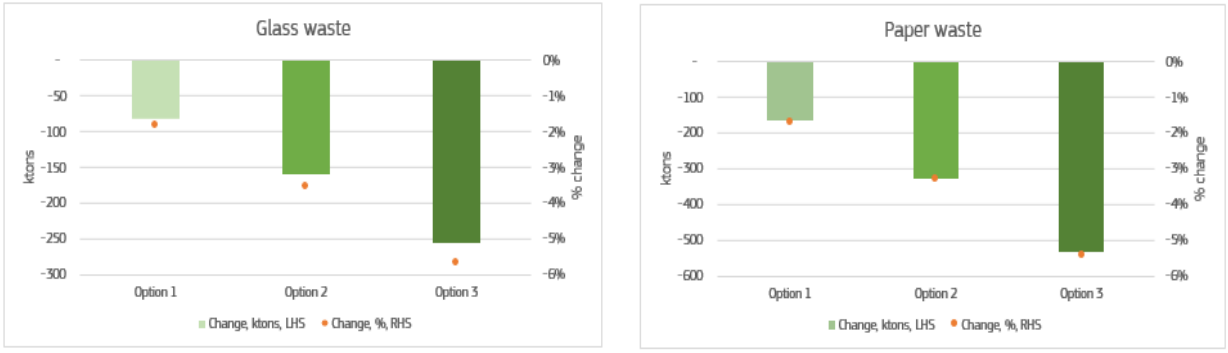
Other studies carried out with the same model (MAGNET) and specific bio-based activities promoting scenarios show the increased use of food waste in the second-generation processing of biomass, creating new growth opportunities for example for bio-based chemicals (Philippidis et al., 2019b, Philippidis et al., 2023).

To summarise, food waste reduction provides, on the one hand, additional land for arable production and non-food uses (if wished by governments and by society), but reduces, on the other hand, in the applied scenario of food waste prevention, to some extent, the availability of food waste for industrial purposes. A holistic assessment of the whole food waste system with different policy support options (also including investments in the food waste collection treatment and processing industries) could give more insights and identify a more efficient policy mix for the circular (bio-)economy.

2.5.5. Food packaging

As discussed in previous sections, food waste reductions lead to less food demand by consumers. This is also reflected in reductions of other waste types such as glass and paper. When less food is purchased, less food packaging waste is created. Figure 80 shows the reductions in household glass and paper waste from food purchases as a total of EU27. In both waste types, we observe a decrease of around 5% in Option 3, which corresponds to a decrease of around 250 ktons for glass waste and over 500 ktons for paper waste. Although not depicted in the chart below as a rebound effect of less food purchases and hence less food packaging, we see a marginal increase in glass and paper waste in other sectors such as services and other manufacturing. However, this increase is approximately limited to 1% in Option 3.

Figure 80: Change in household glass and paper waste (food purchases) for EU27, options vs baseline 2030



Source: MAGNET simulation results

It should be noted that the analysis of potential reductions in food packaging due to food waste reduction is not straightforward. Food packaging plays an important role in the food value chain as it can ensure food safety, enables the product to be transported in good condition and offers convenience to the customers. In addition, packaging can prolong the shelf life of fresh food and prevent the products from spoiling or losing their best shape and taste (Sasaki et al., 2021; White

& Lockyer 2020). Hence, in order to reduce food waste, more packaging material could be necessary for smaller portion offerings or emerging packaging technologies could be used to extend shelf-life of food or to improve food safety. This potential impact of food waste reduction on packaging is not considered in Figure 80.

2.6. Feasibility analysis

This section discusses the feasibility of such targets from the Member States' perspective taking into account:

- the share of edible food waste (which is the fraction that is effectively possible to reduce);
- the efforts made by Member States and other countries in the last decade and the results obtained.

Concerning the effective level of food waste reduction, a maximum theoretical level of food waste reduction achievable can be estimated by considering that at retail and consumption level, the avoidable food waste corresponds to the edible part of food waste generated. This varies significantly across stages of the supply chain and across different products and therefore, the actual food waste reduction potential is diverse among products, for instance, higher in the case of meat and lower in the case of fruits and vegetables. The FUSIONS project estimated an average edible share of food waste at retail level equal to 83%[156]. At household and food services levels, the share of edible food waste was estimated as 70% and 66% of the food waste generated respectively[157]. A weighted average of these three values was calculated based on the levels of food waste generation at retail household and food services level (ESTAT 2022). As a result, the average share of edible food waste over the total food waste at retail and consumption level is equal to 71%. This could therefore be considered the maximum achievable food waste reduction at these stages.

Concerning the feasibility of reaching the food waste reduction targets set in the three alternative policy options, an analysis was conducted on national food waste strategies and policies on food waste reduction, including their implementation, monitoring and reporting. Moreover, a search of quantitative data on food waste reductions reported by Member States and the United Kingdom was performed[158]. The search of data used various sources: information shared in the EU Platform on Food Losses and Food Waste; information gathered by the survey for Member States launched as part of the stakeholder consultation (Annex 2).; national websites; reports from other organizations (WRAP, etc.).

The results of the analysis show that monitoring and evaluation is not a widespread practice and lack quantitative indicators. The few quantitative data on food waste reduction retrieved from this analysis are shown in the table below.

156 FUSIONS, 2016

157 Derived from the results presented in De Laurentiis et al. 2021

158 UK was considered in the analysis due to the fact that this country is a pioneer in food waste reduction

Table 42 - Reported levels of food waste reduction achieved in selected countries

	Retail and distribution		Food services		Household	
Country	FW reduction	Reference time	FW reduction	Reference time	FW reduction	Reference time
NL	3.60%(1)	2018-2022			29%(2)	2010-2019
SE			3.00%(3)	2018-2020		2018-2020
UK	8%(4)	2018-2021			21%(5) 17.8%(6)	2007-2012 2007-2018

(5) edible food waste only

Source: (1) (WUR, 2022), (2) (The Netherlands Nutrition Centre Foundation, 2019), (3) (Naturvårdsverket, 2022), (4) (WRAP, 2022), (5) (Champions 12.3, 2017) (6) (WRAP, 2020)

The following considerations can be derived from these results:

1- Values in the table refer to different reference times, which need to be taken into account when considering that Member States will have roughly six years to reach the food waste reduction targets by 2030, in case the legislation comes into force in 2024.

2- No countries reported food waste reduction achieved in primary production and it is therefore not possible to assess the feasibility of reaching food waste reduction targets for this stage of the supply chain based on the results reported by early achievers.

3- At the processing stage the United Kingdom reported an average reduction of edible food waste equal to 1.4% (WRAP, 2022). However, this value was calculated from data reported by manufacturers referring to different baselines (varying between 2015 and 2020) and cannot therefore support any considerations as to the feasibility of reaching food waste reduction targets over six years especially as these refer to total food waste. Moreover, companies, which conducting measurement of food waste reported progress at the level of 10.8% reduction in total food waste per ton of food handled between 2018 and 2021. However, due to increased production and other factors (such as post-Brexit trade disturbances, COVID-19 and post-COVID rebound, improved measurement by companies…), total food waste in processing and manufacturing has increased over this period by around 9%.[159]

[159] WRAP 2022. The Food Waste Reduction Roadmap Progress Report 2022. https://wrap.org.uk/sites/default/files/2022-12/WRAP_Food_Waste_Reduction_Roadmap_Progress_Report_2022.pdf

4- At retail level the Netherlands reported a food waste reduction equal to 3.6% over 4 years based on which the feasibility of the target proposed in Option 1 seems low. Instead, the United Kingdom reported an 8% reduction over three years, which could suggest that reaching the Option 1 target (15% reduction over 6 years) could be feasible.,

5- At food services level the only available example is Sweden reporting a 3% reduction over two years thereby suggesting low feasibility for all targets.

6- Finally, at household level, roughly similar reductions have been reported by the Netherlands (29% reduction over 9 years) and the United Kingdom (21% reduction of edible food waste over 5 years and almost 18% reduction of total household food waste over 11 years), based on which the Option 1 target can be considered feasible.

When making such considerations on feasibility, it is important to consider that, as presented in Section 3, Member States are at different levels in their implementation of food waste prevention initiatives and therefore assuming that all could replicate results achieved by these two countries would be rather optimistic. Moreover, while the first reductions might be achieved with a lower effort, it might be more difficult and costly to achieve further improvements. Finally, we can observe that results achieved so far are the outcome of voluntary efforts taken by individual countries and that binding food waste reduction targets might be needed in order to achieve more significant results., Experience gained by front-runners, knowledge gained regarding the efficiency of food waste prevention initiatives and continued sharing of best practice through the EU Platform on Food Losses and Food Waste could accelerate such progress.

ANNEX 12: HOW DO THE OPTIONS COMPARE

The measures were assessed individually as detailed in Annex 11. This section sets out the overall assessment of each option and then draws conclusion in terms of how the policy options compare based on the likely impacts of the measures they contained. This comparison is based on how the options contribute to the two main objectives on the balance of economic, environmental and social impacts and on the total costs and benefits where these could be calculated. The 'One-in One-Out' considerations are also explained.

1- Textiles

By way of reminder the objectives for the proposed textiles intervention are to:

- reduce textile waste generation
- to make sure that the textile waste that is generated is treated as high up the waste hierarchy as possible

Option 1 measures would contribute to both intended objectives.

Clarifying definitions (measure 1.1) is necessary to ensure the consistency with which Member States would comply with the separate collection obligation coming into force in 2025 and to facilitate movements of waste to enhance reuse and recycling markets. As described in Annex 11 alternative 3 that takes a definition in keeping with the textile labelling Regulation as a broad family of items that may be considered as textiles but then specifically targets measures at a more defined list of textiles using the coding applicable under the Combined Nomenclature listing is considered the best alternative to define 'textiles' and alternative 1 of defining all separately collected textiles as waste is considered the most appropriate to clarify waste versus non-waste textiles.

For all measures under Option 1 the economic, social and environmental impacts would generally be positive. However, all measures under Option 1 except for clarifying definitions (measure 1.1) are likely to address the objectives to a limited extent. Option 1 is also coherent with existing and planned EU policy initiatives.

The costs of measures under Option 1 are generally limited to administrative costs, including the administrative costs of developing guidance estimated as 135 000 euro per piece as well as staff resourcing from the European Commission. However, Measure 1.1 is likely to result in a reduction of administrative burden for Member States, producers and the waste management sector due to the common terminology for textiles and textile wastes in the context of the WFD across the entire EU. It is difficult to ascertain the full reduction in administrative burden that would take place but an estimation of 250 000 euro per year has been included based on the estimated amount of time currently spent in relation to collection of data and reporting on an unspecified list of textiles at present. Additionally, were waste status for separately collected textiles to only apply after sorting the administrative costs of obtaining and maintaining the relevant waste management authorisations for collectors would be lowered by approximately 200 euro per year per entity based on the average EU permitting costs. Beyond this, benefits arise from increased support to Member States and stakeholders involved in textiles waste

management via guidance dialogue and the sharing of best practice as well as harmonising end-of-waste provisions at the Member State level by adopting an EU-wide set of criteria that can be applied. This should, in turn, provide an incentive to invest in and improve textile waste management infrastructure across the EU and mitigate some of the negative impacts of the way in which textile waste is managed at present.

Option 2 measures would be more effective that Option 1 measures in achieving both intended objectives. Option 2 measures carry higher economic costs than Option 1, while they generate far higher economic, social and environmental benefits. Measure 2.9 specifically ensures coherence with the EU Strategy for Sustainable and Circular Textiles[160] that called for the introduction of harmonised measures for Extended Producer Responsibility for textiles.

Measure 2.5 would lead to additional costs for sorting and subsequent treatment of approximately 913 million euro per year, whilst recovering value via textiles for reuse of 534 million euro per year and recycling of 117 million per year. Mitigating GHG emissions as a result of this measure would also result in a reduction of GHG emission equivalent to 16 million euro per year whilst creating an additional 8 740 jobs. Better sorting would also feed into the better application of end-of-waste criteria foreseen under Option 1 as a result of more textiles being made available for reuse and recycling within the EU than the baseline.

Measure 2.8 would result in small additional costs for Member States (approximately 4 000 euro per Member State) and small additional costs for operators of 78 euro per year per entity. However, the legal certainty for shipments of textiles would be much improved, addressing the problem of textiles exported to third countries as reusable actually comprising wastes that are only suitable for disposal. This would also facilitate the enforcement of waste rules by the competent authorities.

As noted in the list of problem drivers, shortcomings in collection, sorting, reuse and repair and recycling infrastructure of textiles are predominant across much of the EU. Measure 2.9 addresses these by requiring producers to take into account the costs of management of textiles over their entire lifetime, including at the point of discard. The infrastructure shortcomings cause problems not only within the EU but also in third countries to which EU textiles are exported with somewhat questionable reusable status. EPR fees to meet the full management costs of textile wastes within the EU would result in costs in the order of 2.28 billion euro per year by 2035 from the disparate systems currently and likely to be employed by Member States to producers under EPR. These costs may fall 100% on consumers or 100% on producers (or a mix of both) under the EPR approach whereby producers may choose to add the costs of EPR compliance to the costs of goods sold to consumers or not. The maximum price increase that might be expected under this scenario for consumers is 0.6% for the average textile product. The McKinsey & Company report[161] expects that with the correct investment in capital (estimated at between 6 billion and 7 billion for the recycling sector to 2030) annual overall returns for the EU 27[162] would be in the order to 3.5 billion to 4.5 billion euro by 2030. Whilst these estimates

[160] COM (2022) 141 final
[161] McKinsey & Company, 2022.
[162] This estimate includes CH that amounts to roughly 1.1% of total

appear optimistic given the current levels of recycling, they do signal that costs of an EPR scheme are likely to be outweighed by the benefits. The application of Measure 2.9 would effectively address the costs and benefits foreseen for Measure 2.5, as well as contributing to the objectives of Measure 2.8.

Measure 2.14 on reporting would generally see an increase in reporting for approximately 1 400 waste management operators with a total cost of additional reporting of approximately €750 000 for the EU overall. At the same time significant improvements in understanding the volumes of textile wastes generated, collected, sorted and subsequently treated would result as a result of the changes to existing reporting obligations and the small number of additional reporting obligations added.

Option 2 is coherent with existing and planned EU policy initiatives whilst, as noted above, actively contributing to the EU Strategy for Sustainable and Circular Textiles.

Option 3 measures set EU targets for the management of textiles. This top-down approach offers the greatest flexibility to Member States on how to achieve those targets. However, all the targets that could be applied are dependent upon good quality data to define the starting point for Member States in terms of their current textile waste generation volumes, their sorting capacities, their collection, reuse, preparation for reuse and recycling rates. As outlined in Annex 7, there is a lack of common understanding of textiles in the context of the WFD and there are other data and information gaps. This means that option 3 carries the significant risk of setting targets based on incomplete data. Hence, it is not possible to set targets that are ambitious but achievable except for a separate collection target. The existing obligations under Article 11(1) would render such a target more feasible to achieve. It is considered premature to set the other targets assessed.

The measures under Option 3, could the targets be set, would likely be cost effective as flexibility would be left to Member States to achieve them. However, as noted earlier, except in the case of Measure 3.6 it is considered that the current data is insufficient to set such targets with the risk of inappropriate targets being set. In turn, inappropriate investments could be made with resulting benefits also being limited in impact. Measure 3.6, which is the only target that could possibly be set on the basis of the information currently available – even if the studies show large heterogeneity of their predicted rates – would result in extra costs for a number of Member States with collection, sorting and treatment costs totalling 39.5 million euro per year. At the same time approximately 23 million euro of reusable textiles would be available to be placed on the market and 5 million euro of textiles suitable for recycling would be captured. Additional reductions in GHG emissions and increases in employment would also be expected. Option 3 is coherent with existing and planned EU policy initiatives.

Significant and direct environmental impacts from the policy options – more so for Options 2 and 3 – especially on water, soil and air quality are likely to have substantial and positive indirect effects on human health and public health and social care systems across the EU as well as in third countries when textiles or textiles wastes are exported from the EU. This would result in significant indirect positive social impacts that would also benefit the economy by improving labour productivity and other economic factors. These indirect social and economic impacts have been broadly captured as part of the qualitative assessment of environmental impacts.

Table 43 - Balance of costs and benefits for the three options and measures considered in this assessment

Policy option and measure	Description of impact	Overall balance with best alternative
Option 1 – Supporting MS in implementing and enforcing current provisions	**Measure 1.1** **Economic costs**: Measure 1.1 sub-option 1 alternative 1 adds collection costs 660 million euro per year. These costs would fall on producers or consumers or a mix of the two depending on the approach employed at the Member State level to recover the costs of waste management. **Economic benefits**: Reduced administrative burden 250 000 euro per year for businesses. Sub-option 2, alternative 2 offers an admin cost reduction of 200 euro per year as waste permit is not needed. **Environmental benefits**: Better focussed action on the key textile waste streams is likely to reduce the environmental impacts of those streams **Social benefits**: Potential increases in employment in the reuse and recycling sector for the targeted textiles as a result of the measures foreseen.	**Costs**: 135 000 per guidance + COM staff **Benefits**: 250 000 euro per year **Overall effectiveness, efficiency and coherence**: positive but limited except for measure 1.1
	Measure 1.2 **Economic costs**: No specific economic costs have been identified. **Economic benefits**: Better targeted practices and policy measures in relation	

	to waste prevention in Member States to the advantage of business and EU citizens. **Environmental benefits:** Reductions in waste as a result of greater data on and support for waste prevention, as well as greater reuse and recycling. **Social benefits**: Potential increases in employment in the reuse and recycling sector as a result of better targeted waste prevention measures	
	Measure 1.3 **Economic costs**: 135 000 euro per piece of guidance developed + COM staff. Additional costs of application of the measure are dependent upon the actions put into place by Member States as a result of the sharing of best practice. In this respect the greatest costs of application would fall on Member States that currently have low levels of collection of textile wastes. **Economic benefits**: Positive impacts for textile management stakeholders through the sharing of good practice. **Environmental benefits:** Reductions in waste as a result of greater data on and support for waste prevention, as well as greater reuse and recycling. **Social benefits**: Potential increases in employment in the reuse and recycling sector as a result of better guidance and stakeholder sharing of experience..	

Option 2 - Additional regulatory requirements	**Measure 2.5** **Economic costs**: 913 million euro per year for sorting obligations. These costs would fall on producers or consumers or a mix of the two depending on the approach employed at the Member State level to recover the costs of waste management. Landfill tax loss of 26.5 million euro for Member States due to textiles diverted from landfills but tax gain on the sale of secondary materials **Economic benefits**: 534 million per year of reuse value and 117 million euro per year of recycling value from additional sorting **Env benefits**: 16 million euro from GHG emission reduction as well as reduction in release of pollutants to air, water and land that would otherwise result from poor waste management. Replacement of virgin fibres with recycled fibres of between 118 000 and 295 000 tonnes. **Social benefits**: 8 740 jobs created and social impacts of EU waste in third countries mitigated as well as the social costs of fibre production. **Social costs:** Negative impact on the sorting industry in third countries receiving unsorted / poorly sorted EU textiles at present	**Costs**: 963 million euro costs **Benefits**: Direct benefits of 651 million euros of reusable and recyclable materials as well as support to 3.5-4.5 billion euro annual overall returns from EPR investments. **Env benefits**: 16 million euros in GHG emissions averted alongside the wider air quality, water and soil pollution mitigated via current disposal practices in the EU and third countries. Land use savings in relation to virgin fibre displaced by recycled fibres as well as water savings. **Social benefits**: 8 740 jobs created. Reduced social costs for producers of virgin fibres in third countries. Higher quality reusable textiles received in third countries. **Social costs:** Potential job losses in the sorting sector in third countries as a result of increased sorting in the EU. **Overall effectiveness , efficiency and coherence**: positive
	Measure 2.6 **Economic costs**: 0.5 FTE within the Commission to adopt the necessary implementing act.	

	Economic benefits: Minimising divergence of approaches to end-of-waste criteria . Potential savings in the costs of managing textile wastes that reach end-of-waste status for businesses managing such materials. Ensuring sufficiently consistent feedstock from the sorting processes as input to textile recycling. **Env benefits**: Managing textile wastes within the EU in comparison to third countries would result in CO2 eq savings of approximately 81 000 – 225 000 tonnes per year and externality savings of between 13.5 million and 37.7 million euro per year using the 10% waste value and between 54 million euro and 150.8 million euro per year using a 40% waste value. **Social benefits**: Negative impacts of EU waste exported to third countries mitigate including prevention of open dumping and open burning.	
	Measure 2.8 **Economic costs**: 208 euro per competent authority and 78 euro per exporter annualised per inspection **Economic benefits**: Reduced textile waste management costs to the reuse operators within or outside the EU on account of reduced share of potential waste fractions in the bales of sorted textiles for reuse imported from the EU. **Env benefits**: 16 million euro from GHG emission reduction as well as reduction in release of pollutants to air, water and land that would otherwise result from	

	poor waste management. **Social benefits**: 8 740 jobs created and social impacts of EU waste in third countries mitigated.	
	Measure 2.9 **Economic costs**: Shift of economic costs from the current disparate systems employed by the majority of Member States for the management of textile wastes to producers under extended producer responsibility. These costs that would be applicable under the baseline anyway would fall on producers or consumers or a mix of the two dependent on the approach employed at the Member State level to recover the costs of waste management. Register development costs of 2-12.3 million euro across all Member States and maintenance costs of 11 200 and 69 000 euro per Member State per year. 7.79 euro million per year for producers to report for the purpose of EPR 4.04 euro million costs of operating PRO registers and inspections **Economic benefits**: Support to 1.1 billion euro of reusable textiles would be available to the market as well as 188 million euro of textiles for feeding into closed loop recycling and 49 million of textiles for open loop recycling operators. Support to 3.5-4.5 billion euro annual overall returns on recycling investment (including the costs and benefits indicated for the other measures) and 1.1 billion euro annual recovery of reusable textiles	

	Tackling potential divergence in Member State national EPR schemes and the resulting level playing field challenges that would result. **Env benefits**: Application of the polluter pays principle supporting a reduction in textile waste sent for disposal of 670 000 tonnes per annum and the resulting environmental impacts of that disposal. Support for the displacement of virgin fibres with greater recycled fibres through support to the textile recycling sector and resulting land use and water use savings. **Social benefits**: Support for 5 500 jobs created and social impacts of EU waste in third countries mitigated.	
	Measure 2.14 **Economic costs**: 750 000 euro per year for EU enterprises to comply with EU reporting obligations **Economic benefits**: Better understanding of textile management within the EU in particular for pre-consumer, post-commercial and post-industrial wastes **Env benefits**: Improved knowledge of the textile waste problem allowing better targeted measures to address the environmental impacts of those wastes **Social benefits**: No specific benefits identified.	
Option 3 – Targets (assessed for separate collection target)	**Economic costs**: 39.2 million euro per year for additional textile collection, sorting and treatment in Member States that are unlikely to meet a 50% collection target by 2035.	**Economic costs** €39 million per year (covered by the EPR measure 2.9)

	These costs would fall on producers or consumers or a mix of the two dependent on the approach employed at the Member State level to recover the costs of waste management. Lack of robust data makes target setting for textile waste management premature for most targets **Economic benefits**: 23 million euro per year of reuse value and 5 million euro per year of recycling value for the reuse and recycling sectors. **Env benefits**: Additional GHG emission reduction	**Economic benefits** 28 million euro per year **Env benefits**: Additional GHG emission reduction **Overall effectiveness, efficiency and coherence**: Effective if the targets are met. Ensures flexibility of implementation in Member States.

2- Food Waste

As comparison of the options result directly from Annex 11 and was summarised in the main text of Staff Working Document, no additional information on the comparison of the options is provided here.

ANNEX 13: PREFERRED OPTION

1- Textiles

The preferred option would be to combine the green-rated policy measures illustrated in the Table below. These measures compose a 'preferred' policy package for the revision of the WFD. The implementation of such measures would likely generate significant and positive impacts that significantly outweigh the costs involved in their application. The preferred policy package would involve the measures listed in the table, aiming to address the two specific objectives:

- reduce textile waste generation, and
- increase the recycling of textile waste and reduce the amount of residual textile waste.

Table 44 – Impacts of textile policy measures in the preferred option

Policy measure	Impact of the measure
Measure 2.5 – Setting sorting obligations for separately collected textiles and textiles waste	As well as ensuring that once collected within the EU that textiles are sorted with the waste hierarchy in mind, better sorting in the EU looks to limit the possibility of textile wastes being mixed with reusable textiles and exported to third countries where they place an economic, environmental and social burden on the countries of destination.
Measure 2.6 – Adopting end of waste criteria	Ensuring a coordinated approach to determining when textile waste is no longer a waste looks to limit distortions in the EU market in relation to reuse and recycling whilst facilitating easier movement of materials when they no longer pose an environmental threat and can be safely used.
Measure 2.8 – Setting requirements for shipments of textiles for reuse	In coordination with Measure 2.5, ensuring that exports of reusable textiles are actually reused at the point of destination and do not contain textile wastes looks to address the economic, environmental and social burdens that are currently related to the export of EU waste textiles to third countries.
Measure 2.9 – Mandating the use of EPR	The effective management of textile wastes is dependent on an informed public, sufficient waste management infrastructure and research and development to support innovation. EPR effectively ensures that the required funding is put in place to finance these actions and producer is incentivised to adapt product design to facilitate waste management in line with the waste hierarchy.
Measure 2.14 – Setting reporting obligations for textiles	Information on the generation of textile wastes, their collection, sorting and treatment is exceedingly limited. This prevents the development of well-informed waste management infrastructure and future policy making. Adjusting present reporting obligations as well as adding additional reporting obligations would address this information shortcoming allowing better targeted and informed

	action in the future.
Measure 3.6 – Setting a separate collection target for textile waste	Setting a separate collection target could additionally be considered. It may addsclarity to the obligation under Article 11(1) of the WFD whilst ensuring that Member States achieve at least a 50% collection rate for textiles thereby increasing the volumes of textiles available for reuse and recycling whilst reducing the volumes of textiles currently discarded in residual waste. At the same time, it imposes administrative burden, setting the exact rate might be challenging given the large heterogeneity of predicted rates across different studies and the existing 2025 separate collection obligation may have a similar effect on the rate.

The implementation of such measures would likely generate significant and positive impacts that significantly outweigh the costs involved in their application. This would include:

- Economically ensuring the that costs of managing textile wastes fall on the producers of those wastes (with a shift in cost under the baseline from the disparate systems likely to be used to producers under EPR of approximately 2.28 billion euro (Measure 2.9)) whilst ensuring better recovery of the values of the wastes generated in terms of textile reuse and recycling of textiles including support to the development of closed loop recycling in the EU (Measures 2.5, 2.6, 2.8, 2.9 and 3.6) to the extent that such recovery of value may recover 75% of the costs concerned (Measure 2.5). Possible economic impacts on third countries are detailed (e.g., for textiles producers in third countries) in the dedicated section/chapter.
- Environmentally reducing the negative impacts of textile waste disposal by greater reuse and recovery within the EU (Measures 2.5, 2.6, 2.9 and 3.6) whilst better addressing the impacts of used textiles and textile wastes exported from the EU in third countries (Measure 2.5, 2.6 and 2.8) including reducing GHG emissions.
- Socially mitigating the social impacts of poor textile waste management both within the EU (Measures 2.5, 2.6, 2.9 and 3.6) and in third countries (Measure 2.5, 2.6 and 2.8) whilst increasing employment in the waste management sector including textile recycling (Measures 2.5, 2.6, 2.9 and 3.6) and providing support to social enterprises and the role they play in managing used textiles (Measure 2.9).
- Administratively giving much greater clarity in relation to the scope of textiles subject to the provisions of the WFD (Measure 2.9) as well as greater information on the flows of those textiles and on the results of efforts by Member States to address used textiles and textile wastes (Measure 2.14). Reducing administrative burdens in relation to unclear reporting (Measures 2.9 and 2.14) and adding reporting obligations only where they are most relevant (Measures 2.9 and 2.14).
- Specifically in relation to SMEs the textiles sector is dominated by SMEs and micro-enterprises comprise over 86% of the sector. The chosen measures have been specifically

tailored to minimise the financial and administrative burden that would fall on micro-enterprises most notably by excluding them as producers for the purpose of EPR. At the same time, the support to reuse and recycling will assist SMEs in these fields in comparison to the status quo by ensuring better funding is available and a more stable feedstock of reusable textiles and recyclable textiles are available on the market.

Table 45 – Impacts of textiles preferred option

Preferred option	Description of impact	Overall balance
Option 2 - Additional regulatory requirements + 3.6 target	**Economic costs**: 913 million euro per year for sorting obligations Register development costs of 2-12.3 million euro across all Member States and maintenance costs of 11 200 and 69 000 euro per Member State per year. 7.79 euro million per year for producers to report for the purpose of EPR 4.04 euro million costs of operating PRO registers and inspections 39.2 million euro per year for additional textile collection, sorting and treatment in Member States that are unlikely to meet a 50% collection target by 2035 208 euro per competent authority and 78 euro per exporter annualised per inspection 750 000 euro per year for EU enterprises to comply with EU reporting obligations Landfill tax loss for Member States due to textiles diverted from landfills **Economic benefits of additional sorting**: 534 million per year of reuse value and 94 million euro per year of recycling value	**Costs**: 975 million euros costs. These costs may fall 100% on consumers or 100% on producers (or a mix of both) under the EPR approach whereby producers may choose to add the costs of EPR compliance to the costs of goods sold to consumers or not. **Benefits**: Direct benefits of 656 million euros of reusable and recyclable textiles for the EU reuse and recycling market as well as support to 3.5-4.5 billion euro annual overall returns from EPR investments. Additional GHG emission reduction equal to 16 million euro per year 8 740 jobs created **Overall effectiveness and efficiency**: positive

	Economic benefits of additional collection: 28 million euro per year of combined reuse and recycling value **Supported (indirect) Economic benefits of EPR**: 3.5-4.5 billion euro annual overall returns on recycling investment (including the benefits indicated for the other measures) **Env benefits**: 16 million euro from GHG emission reduction as well as reduction in release of pollutants to air, water and land that would otherwise result from poor waste management. **Social benefits**: 8 740 jobs created and social impacts of EU waste in third countries mitigated.	

Impacts on competitiveness

Table 46 – Impacts on competitiveness

Dimensions of competitiveness	**Impact of the initiative (++ / + / 0 / - / -- / n.a.)**	**References to sub-sections of the main report or annexes**
Cost and price competitiveness	+/-	Annex 11
Dynamic competitiveness	++	Annex 11
International competitiveness	+	Annex 11
Strategic competitiveness	+	Annex 11
SME competitiveness	0	Annex 11

Costs and price competitiveness – The initiative will result in the application of fees to certain categories of textiles goods placed on the market, namely clothing and household textiles via extended producer responsibility. The fees are targeted at addressing the costs of managing textiles at their point of discard and will be set by Member States and monitored at the EU level. Micro-enterprises are exempted from these provisions. Compliance costs will be minimised through the use of Producer Responsibility Organisations that will coordinate compliance on behalf of producers. The provisions would apply to goods placed on the market that are manufactured within the EU as well as those imported and placed on the market from third

countries. The fees are expected to account for less than a 3.5% increase in the total costs of textile products whilst at the same time raising 2.3 billion euro to fund collection, sorting, reuse and recycling. The mandatory involvement of all relevant stakeholders in the development and implementation of EPR schemes looks to address potential for anti-competitive behaviour in their operation. Impacts of price competitiveness are generally linked to the level of action taken by Member States to date to address textile wastes, with those Member States generally lagging behind facing the greatest price competitiveness impacts.

Dynamic competitiveness – The initiative generally improves dynamic competitiveness in the EU, in particular through increased research and innovation in the reuse, repair and recycling sectors directly supported by a clear funding mechanism under EPR. The initiative will simplify movements of textiles for reuse and recycling by adopting end-of-waste criteria applicable across the EU. The fees raised through extended producer responsibility will feed into textile waste management including sorting and recycling infrastructure increasing the speed of innovation in this important sector whilst providing information to the public on textile waste prevention at the Member State level.

International competitiveness – No significant impacts on international competitiveness have been identified as the most significant costs apply to both goods manufactured within the EU as well as those imported into the EU. Manufacturers of textiles in the EU would not be subject to the proposed EPR fees for their goods placed on the market outside of the EU.

Strategic competitiveness – The initiative would directly support strategic competitiveness, reducing reliance on imports of textiles and textile products into the EU through increased reuse and recycling, directly replacing virgin fibres with their recycled equivalent.

SME competitiveness – The textiles industry is dominated by SMEs. The most costly aspect of the initiative – the application of EPR – would not include the majority of SMEs as micro-enterprises that comprise approximately 86% of the sector are proposed to be excluded. The greatest knock-on consequences of their exclusion would be an increase in costs in enterprises with greater than 50 employees by approximately 11% in comparison to a situation whereby micro-enterprises would be included. These costs are not expected to impact on competitiveness given their relatively low level.

Impacts on third countries

The Measure on setting sorting obligations (2.5) adopting end of waste criteria (2.6) and setting requirements for shipments of textiles (2.8) are linked. Their aim it to ensure that the impacts arising from illegal shipments, whereby used textiles exported as used contain textile waste fractions (textiles not fit for re-use in the receiving market) are reduced. Measure 2.8 sets minimum requirements for distinguishing shipments of re-usable textiles from shipments of waste textiles. Measure 2.8 does not restrict exports; it aims to ensure that textiles exported for reuse purposes have undergone sorting operations to ensure that they are reusable. With respect to unsorted textiles which are shipped as waste, sorting can take place outside the EU in accordance with the WSR if the provisions of the WSR are respected. Measure 1.1.2.1 as taken up in measure 2.5. mandate that when used textiles are collected they are to be regarded as waste

until they have undergone sorting or other recovery operations leading to an end of waste status. Measure 2.5 and 2.6 sets sorting obligations to separate the fraction for reuse that can then exit the waste status. The sorting obligation will set a number of criteria to ensure that the textiles that are exported are reusable as much as possible. Textiles that would remain unsorted can still be exported but would have to be exported as waste in accordance with the requirements of the Waste Shipment Regulation (which include different requirements for textile waste exported to OECD or non-OECD countries and textile waste exported for recovery or disposal) which ensures that waste is exported to countries that may ensure sound management of waste.

The preferred option ensures that textiles are exported according to their verified status, reusable versus waste without imposing any trade restrictions. The measures is therefore the least trade restrictive necessary to achieve the environmental objectives of the measure. In 2021, the countries importing most of the textiles exported from the EU were Pakistan, the United Arab Emirates, Tunisia, Cameroon, Turkey and Togo. These countries may import these textiles and then dispatch them to other countries in the region, there is no information in that respect. Of these only Turkey is an OECD member country. To export to non-OECD, traders will have to either export the textiles as reusable (and hence having undergone prior sorting according to measure 2.5) or as waste.

In the case of reusable textiles, there may be an impact on importers who may receive less volumes of textiles as they have been better sorted and potentially reuse more in the EU. However, they would also get lower shares of waste in the imported bales, reducing the preparation for reuse and waste management costs and reducing the administrative burden on the enforcement of illegal shipments. In addition, received less waste will have a positive environmental impact by reducing the textiles that end up burned or dumped where there is a lack of appropriate waste management infrastructure. Measure 2.5 on setting sorting requirements also requires sorters to collect information on the fate of the textiles exported for reuse. Local reuse actors and NGOs are the best placed actors to assist the sorting operators in data collection in third countries to provide the required information. This will create new business opportunities for local third country textile reuse actors.

In the case of textile waste, according to the proposal for a WSR, export to non-OECD member countries will only be possible if the third country demonstrates its ability to treat waste in an environmentally sound manner. This will reduce the amount of textile waste exported to where it can be managed in an environmentally sound manner.

There is also an impact on companies importing new textiles in the EU as they will be subject to the EPR rules (measure 2.9) as are the producers in the EU (to the extent that they are not exempt as micro-enterprises). This mainly concerns producers in China which represents over one third of finished textiles and clothing imports to the EU markets (includes fashion and clothing, furnishing and home, and industrial and technical). EU is the second largest producer of textiles consumed in the EU and following that there are a number of other Asian countries.

2- Food Waste

The preferred option for the food waste part would be the option 2 which considers the following combinations of targets per sector of the food chain:

- Target for primary production – 0%,
- Target for processing and manufacturing – 10%,
- Target for retail and consumption stages – 30%

It is expected that this option will be efficient in providing a strong policy impulse for Member States to take action to reduce food waste at national level, while being proportionate and politically feasible.

The main environmental, economic and social impacts from this option are summarized in the tables below:

Table 47 – Main food environmental impacts

Impacts	**Option 2**
Reduction of GHG emissions (MAGNET model)[163] [Million tCO2eq]	3.9 in the EU (and 12.6 out of EU)
Reduction of GHG emissions (Environmental footprint)[164] [Million tCO2eq]	62
Reduced impact on land use [Trillion Pt][165]	2.2
Reduction in marine eutrophication [Million kg N eq.]	532
Reduction in water scarcity [Billion m3 water eq.]	80

Table 48 - Main food economic impacts

Impacts	**Option 2**
Demand for food	-4.2%
Change in the value of agri-food production	-1.8%
Change in market prices	-0.1% to -2.6%

[163] Calculated with MAGNET model including rebound effect. Rebound effect refers to increased emissions resulting from increased economic activities in other sectors due to savings from food spending being spent on other types of consumption

[164] Calculated with bottom-up analysis

[165] Pt - Dimensionless (point) unit representing soil quality index (LANCA model) - taking into account erosion resistance, physicochemical filtration, groundwater regeneration, mechanical filtration and biotic production.

Trade Balance (TB) per sector[166]	AGRI TB: 2 691 mln EUR FOOD TB: 2 217 mln EUR
Farm income	-4.2 bn EUR
Estimated adjustment costs[167]	**Household:** 20 EUR/ton to 158 EUR/ton
	PROC: 13 EUR/ton to 29 EUR/ton **RETAIL**: 25 EUR/ton to 123 EUR/ton

Table 49 - Main food social impacts

Impacts	**Option 2**
Change in jobs in agri-food sectors[168]	- 135 000, -1.3%
Average share of food expenditure (agri-food and food services) [% of total household expenditure]	17.0%
Savings in food expenditure per household (of four persons) [EUR per year]	439

Impacts on competitiveness

Table 50 - Overview of impacts on competitiveness

Dimensions of competitiveness	**Impact of the initiative (++ / + / 0 / - / -- / n.a.)**	**References to sub-sections of the main report or annexes**
Cost and price competitiveness	+	Annex 11, Annex 15
Capacity to innovate	+	Annex 11

[166] AGRI includes all primary agricultural commodities (crops and livestock), FOOD includes all processed food commodities, including food services

[167] PRIM – primary production. PROC – processing and manufacturing. Household includes out-of-home consumption (food services)

[168] i.e. primary production and processing and manufacturing and not including retail and food services

International competitiveness	+	Annex 11
SME competitiveness	0	Annex 11, Annex 15

Costs and competitiveness – The initiative is expected to result with national actions to support food waste prevention. It is expected that food business operators which will optimize their business process will become more competitive. However, this IA is not able to quantify that process. Based on exchanges with stakeholders it expected that the costs for adapting the operation will be quickly offset by savings from reduction due to less waste (lower treatment costs) and savings on raw material purchases.

It is generally regarded that food business operators have an inherent economic incentive to reduce food waste as it impacts directly on their profits. Moreover, numerous business cases shows that more insight on food waste generation in their operations, measurement of food waste and taking action to address hotspots brings significant savings, with some reports indicating average benefits-cost ratio of 7:1 or even more. Similar business cases analysis covered hotels The Business Case for Reducing Food Loss and Waste: Hotels | Champions 12.3 (champions123.org), catering The Business Case for Reducing Food Loss and Waste: Catering | Champions 12.3 (champions123.org) or food business in general The Business Case for Reducing Food Loss and Waste | Champions 12.3 (champions123.org).

Capacity to innovate – The targets of reduction of food waste should create additional incentive in several areas of innovation, such as use/uptake of digital tools (e.g., optimisation of stock and logistics, food sharing applications, food consumption prognosis) or bioeconomy (drive to find high value use for food not destined for human consumption). As sharing of best practices is one of the most often used tools at both at EU (EU Platform on Food Losses and Food Waste) and national levels, it is expected that the uptake of innovation will be spreading fast.

International competitiveness – Food waste reduction targets have no direct impact. However, the model expected that as result of reduction on demand for food the prices on EU market will decrease, making European food relatively cheaper at the international markets. This mechanism and expected values are described in Annex 11 (section on trade impacts).

SME competitiveness – It is expected that there will be no impact on competitiveness of SMEs – i.e., distribution of costs and benefits resulting from the proposed policy option are expected to be similar, regardless of business size. See Annex 15 for more details.

Impacts on third countries

See section on international competitiveness above. No other impact on third countries is expected.

3 - Combined effects of the preferred measures on textiles and food waste

Table 51 – Combined impacts of the preferred measures on textiles and food waste

Preferred combined option	Description of impact	Overall balance
Option 2 - Additional regulatory requirements + target for textiles	**Economic costs for textiles**: • €913 million per year for sorting obligations • Register development costs of €2-12.3 million across Member States and maintenance costs of €11 200 and 69 000 per Member State per year • €7.79 million per year for producers to report for the purpose of EPR • €4.04 million costs of operating PRO registers and inspections • €39.2 million euro per year for additional textile collection, sorting and treatment in Member States that are unlikely to meet a 50% collection target by 2035 • €208 euro per competent authority and €78 per exporter annualised per inspection • €750 000 per year for EU enterprises to comply with EU reporting obligations • €26.5 million landfill tax loss for Member States due to textiles diverted from landfills **Economic costs for food**: Reduction in demand for food of 4.2% and a change in value of agri-food production of -1.8% alongside a fall in market prices of between 0.1 and 2.58%. A fall in farm income of euro 4.2 billion euro per annum. Implementation costs of 43 EUR/ton	**Costs**: €975 million (these costs may fall 100% on consumers or 100% on producers or a mix of both). Combined costs of 84 euro / tonne to 145 euro per tonne of food produced for food. **Benefits**: Direct benefits of €656 million of reusable and recyclable textiles for the EU reuse and recycling market as well as support to €3.5-4.5 billion annual overall returns from EPR investments Reduction in household food costs of 439 euro per year. Additional GHG emission reduction equal to €16 million per year from textiles and additional GHG emission reduction equal to 4.1 million tonnes per annum per year 8 740 jobs created in waste management but 135 000 lost in agri-food sectors. **Overall effectiveness, efficiency and coherence**: positive

	to 70 EUR/ton for household, 7 EUR/ton to 22 EUR/ton for producers and 34 EUR/ton to 53 EUR/ton for retailers. **Economic benefits for textiles:** • EPR: €3.5-4.5 billion annual overall returns on recycling investment (including the benefits indicated for the other measures) • Additional sorting: €534 million per year of reuse value and €94 million per year of recycling value • Additional collection: €28 million per year of combined reuse and recycling value **Economic benefits for food:** Household savings in food expenditure: 439 euro per year **Env benefits**: €16 million from GHG emission reduction from textile waste as well as reduction in release of pollutants to air, water and land that would otherwise result from poor waste management. 4.1 million tonnes GHG emission reduction as well as reduction in release of pollutants to air, water and land that would otherwise result from poor waste management. Reduced impact on land use of 2.2 trillion Pt, reduction in marine eutrophication of 532 million kg of Neq and reduction of water use of 80 billion m3 per annum. **Social benefits**: 8 740 jobs created in relation to textiles and social impacts of EU waste in third countries	

	mitigated. 135 000 jobs lost in agri-food sectors.	

ANNEX 14: MONITORING AND EVALUATION

1- Textiles

The impact of the preferred policy option in the attainment of the objectives of this initiative to reduce textile waste and residual textile waste generation would be monitored through the indicators and targets set forth in measures 2.1 and 2.15 and 3.6. This entails assessment of the Member State annual reports on textiles waste management which are currently reported to the Commission and verified and published by Eurostat (see Annex 10 for details).

More specifically, as from the date of the entry into force and transposition of this Directive and putting in place the necessary secondary legislation, Member States would be required to carry out a more granular monitoring of the waste prevention measures, waste generation and collection and subsequent treatment operations for all textile wastes. This monitoring will take place based on the proposed:

- EU-wide waste prevention indicators for textiles (adopted through an implementing act, possibly collected through Producer Responsibility Organisations (PROs));
- Increased granularity of the data collection and reporting on used textiles and textile waste management (specified in the WFD and in the implementing act setting out the harmonised reporting formats);
- Separate collection target for textiles.

The improved reporting obligations would deliver more reliable data on the textile waste management practices and performance for the purposes of monitoring at national level the adherence to the waste hierarchy and textile waste management policy planning, including for the necessary investment needs by the competent authorities as well as the industry stakeholders. Improved reporting and monitoring can build awareness amongst all players including consumers about the need for prevention.

The main indicator against which this initiative should be evaluated is the reduction in residual textile waste generated, i.e. textile waste that is destined to disposal operations. The proposed measures should lead to simultaneous and steep infrastructure capacity growth across the EU in separate collection, sorting and recycling (capacity should be enough to deal with collected textile waste). Further, the evaluation should see the progress on the objective of creating a profitable textiles recycling sector and achieving investments in R&D and scaling up/maturity of technologies.

2- Food Waste

Monitoring and evaluation of progress towards **food waste** reduction target will be done on the basis of annual reports from Member States on food waste amounts according to the existing harmonised methodology and reporting rules of the WFD. The data are reported to and published by Eurostat (Annex 5 details food waste monitoring). The current monitoring of food waste reduction allows to address the **operational objectives** identified in this IA, namely:

Table 52 – Monitoring by objective

Operational objectives	*Reporting and monitoring of food waste under the WFD:*
Ensure consistent response by all MS to reduce food waste in line with targets	*Amounts of food waste by Member States, by main economic sectors, including at households*
Improve efficiency of national waste prevention programmes	*Following review of national food waste prevention programmes shows that measures are strengthened (e.g., hotspots identified, etc).*

Implementation of the national food waste prevention programmes and textile waste prevention measures as part of the national waste prevention programmes is subject to periodic reviews by the European Environment Agency (as required by Article 30(2) of the WFD). The Agency publishes every two years, a report containing a review of the progress made in the completion and implementation of waste prevention programmes, including an assessment of the evolution as regards the prevention of waste generation for each Member State and for the Union as a whole.

ANNEX 15: SME TEST

1- Textiles

Step 1/4: Identification of affected businesses

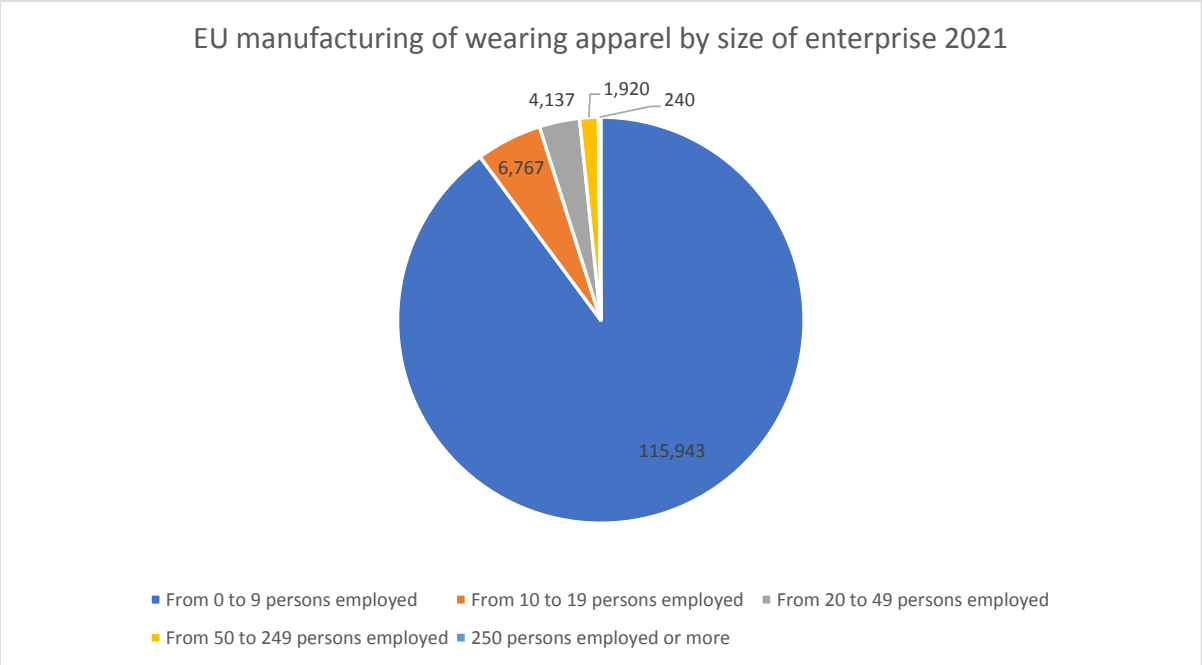
The EU is both a manufacturer of textiles and an importer of textiles from other countries. Producers in the context of these two sources of textiles will vary with some being manufacturers who place goods on the market that have been manufactured within the EU and others more likely to be wholesalers or retailers that import goods from third countries that place goods on the EU market for the first time.

The composition of these two groups in terms of enterprise size is similar and is well reflected in the data found in the 2022 review of the European Apparel and Textile Confederation[169] that notes that 99.8% of total companies in the industry are micro and SMEs.

In relation to EU textiles, wearing apparel and leather manufacturing, data from Eurostat[170] indicates that out of 226 624 total enterprises, 198 443 (87.6%) are micro-enterprises (0-9 employees), 27 485 (12.1%) are SMEs (10-249 employees)[171] and the remaining 696 (0.3%) employ 250 persons or more. The split of turnover by enterprise size indicates a different split with enterprises in the size 20 employees and up accounting for 80% of industry turnover. Inclusion of the 10–19-person size enterprises raises this value to 88% of industry turnover. Effectively this means that 12% of manufacturers generate 88% of industry turnover.

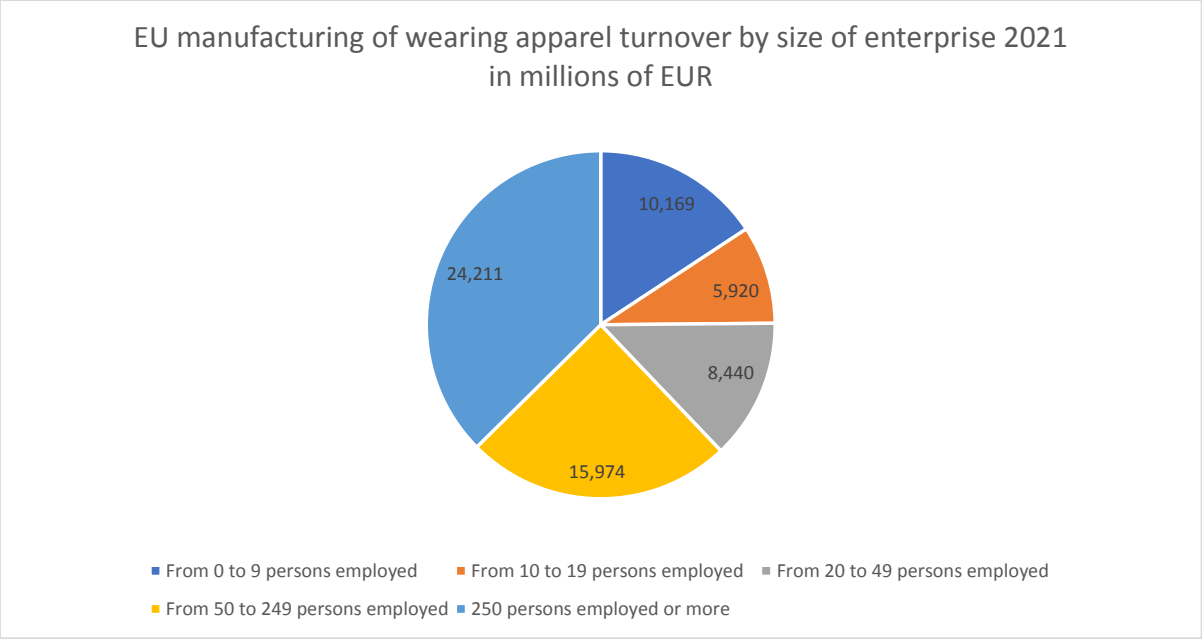
Figure 81 – Textile manufacturers by size of enterprise

[169] EURATEX, 2022. Facts & key figures of the European textile and clothing industry 2022
[170] Annual enterprise statistics by size class for special aggregates of activities (NACE Rev. 2) [SBS_SC_SCA_R2__custom_3996079]
[171] 13 758 employee 10-19 persons, 9 106 employ 20-49 persons and 4 621 employ 50-249 persons.



Source: Eurostat, 2022

Figure 82 – EU textile turnover by size of enterprise



Source: Eurostat 2022

For the textile and leather wholesale and retail sector this kind of data broken down by size of enterprise is not available. However, information on the nature of the enterprises, numbers and average number of employees is available from Eurostat[172] that shows splits by agents involved

[172] SBS_NA_DT_R2

in the sale of textiles, clothing, fur, footwear and leather goods, wholesalers, retail sales of textiles in specialised stores and retail sale via stalls and markets. In terms of the number of enterprises involved in retail the values from Eurostat for 2020 are as shown below.

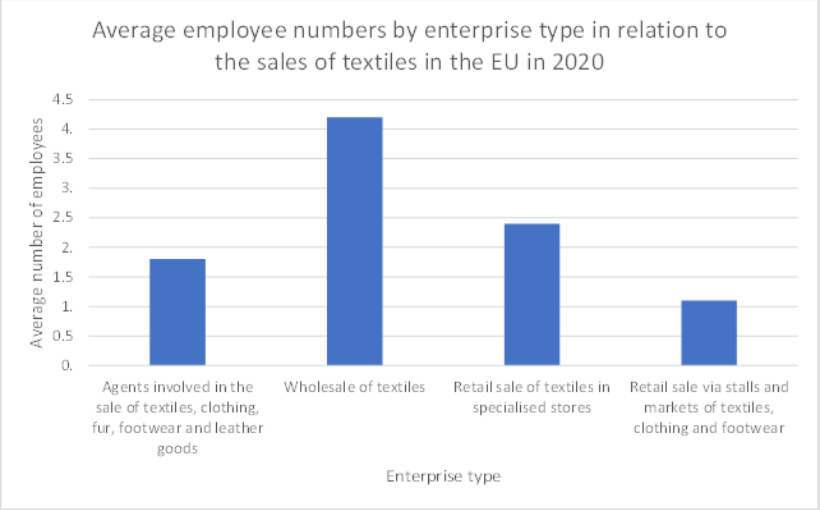
Figure 83 – Enterprises involved in the sale of textiles, clothing, fur, footwear and leather goods



Source: Eurostat 2022

The number of employees per enterprise at the retail level is only provided as an average. However, the values are provided below.

Figure 84 – Average employee numbers by enterprise type in relation to the sales of textiles in the EU in 2020



Source: Eurostat 2022[173]

[173] Enterprise statistics by size class and NACE Rev. 2 [SBS_SC_OVW]

Even without the ability to split enterprises by number of employees it is apparent from the Eurostat Annual detailed enterprise statistics for trade (NACE Rec. 2 G as found in SBS_NA_DT_R2) that the retail sector is dominated by smaller companies with a small number of employees, typically sole trades and stores with 2-3 employees at the store side, with agents similarly small in terms of number of employees and wholesalers generally larger in size.

Given SMEs are the majority of those involved in the placing on the market of textiles as well as, alongside social enterprises, their collection at the point of discard the initiative is considered as relevant for SMEs. The IA includes assessment on the impacts of the initiative on SMEs of all sizes (micro, small, medium) across the EU, which are considered to be the most affected by the initiative.

The scope of the legislative proposal in the area of textile waste is to improve textile waste management in line with the waste hierarchy prioritising reuse and recycling of clothes and household textiles.

Whilst it is generally accepted that textile manufacturers and retailers have an inherent economic incentive to reduce textile waste, the increasing volumes of textiles placed on the market as well as the manner in which post-consumer textiles from these actors is handled at the point of discard is subject to significant shortcomings that this initiative looks to target.

Step 2/4: Consultation of SME stakeholders

Within the context of the public consultation SMEs, among other stakeholders, were invited to both respond to questions in relation to waste in general as well as for textile waste. Furthermore, SMEs were invited to submit additional information including position papers. 211 business associations, company / business organisations and consumer organisations that fell into the SME category responded to the public consultation.

In general, SMEs pointed out in their position papers that currently there is no large-scale planning to process the waste. Most of them agreed that textile production's design and consumption patterns have to be changed, leading to the production of textiles of higher quality that can last longer. They also highlighted the importance of prioritizing waste prevention and reuse and the need to set reuse and preparation for reuse targets, as well as to improve separate collection systems. Regarding EPR, the main points were to ensure that EPR schemes enforce the waste hierarchy by setting quantitative targets for waste prevention and preparation for reuse, ensure a harmonised approach to eco-modulation of EPR fees and the fair competition in recycling markets, granting access to the waste stream to preparing for reuse operators, while also involving social enterprises as key stakeholders in the development, governance and functioning of these schemes. Also, the harmonisation at EU-level of end-of-waste criteria was advocated which was also endorsed by the recycling industry, as well as the insurance of the consistency with other regulatory initiatives, such as the ESPR and WSR. Further, they pointed out that guidance to achieve high levels of separate collection of textile waste is needed, while maturing fibre sorting and pre-processing is critical to scale the recycling of post-consumer waste. Some of them reflected on the need for a harmonised definition of textile waste.

Some of the key SME representatives consulted in the context of textile waste were:

EURATEX – Representing the national associations of AT, BE, BG, CZ, DE, DK, EL, ES, FI, FR, HR, IT, LT, NL, PL, PT, RO and SE the European Apparel and Textile Confederation provided input to the call for evidence and the public consultation. They were also interviewed

by the consultants team. The public information made available from Euratex provides information on the size of the entire sector that is not split into members and non-members. However, with the Member State national associations listed a majority of the 143 000 companies reflecting the composition of the textile industry, involved in the EU textile and clothing industry are represented by Euratex.

EURIC – Representing the recycling federations of 18 Member States and over 5 500 companies including SMEs and with a specific group dedicated to textiles (EURIC TEXTILES), EURIC provided input to the call for evidence as well as the public consultation. Furthermore, additional evidence was submitted directly to the European Commission, most notably the LCA-based assessment of the management of European used textiles issued in January 2023 that was used specifically in the assessment of environmental benefits of specific measures.

The Policy Hub represents more than 700 brands, retailers and manufacturers and other textile stakeholders including NGOs representing more than 50% of the apparel and footwear sector. The Policy Hub provided input to the call for evidence and the open public consultation. Additionally, the Policy Hub was interviewed by the support study team.

RREUSE represents social enterprises active in reuse, repair and recycling in the EU. With association members in AT, BE, CZ, DE, EE, EL, ES, FI, FR, HR, HU, IE, IT, LT, NL, PL, RO, and SI as well as individual social enterprise networks in SE and LV RREUSE provided input to the call for evidence and the public consultation. RREUSE was also interviewed by the support study team.

Municipal Waste Europe, representing national public waste associations and similar national or regional associations in AT, BE, CY, DE, DK, EL, FI, HR, IT, LT, MT, NL, PL, PT, SE, and SI provided input to the call for evidence as well as the open public consultation. They were also interviewed in the context of the support study.

FEAD, representing the private resource and waste management industry covers 17 Member States and 3 000 companies involved in waste management. The membership of FEAD covers 60% of the household waste market and 75% of industrial and commercial waste management in Europe including 2 400 sorting and recycling centres, 1 100 composting sites, 260 waste-to-energy plants and 900 controlled landfills. FEAD provided input to the call for evidence and public consultation.

Step 3/4: Assessment of the impact on SMEs

In addition to the collection of stakeholder evidence on the potential impacts on SMEs additional assessment using data from Eurostat on the composition, turnover and spread of SMEs was performed in order to identify those impacts that would significantly impact on such enterprises.

The consultants study considered the specific impacts on SMEs for each measure. In this respect measures under Option 1 are likely to place no significant administrative burden on SMEs, while at the same time the measures should simplify obligations placed on SMEs aligning the scope of textiles. The guidance and support platform foreseen under this option would have the largest impacts on SMEs overall.

Measures under Option 2 and 3 are expected to have minor additional costs on SMEs. The most burdensome measure that considers the application of extended producer EPR schemes (measure 2.9) would address SMEs given the majority of producers are SMEs. However, in order to avoid the application of unnecessary administrative and compliance burdens, the impact assessment

proposes to exclude micro-enterprises and the re-use sector from the scope. Reuse actors that place both new and used products on the market, would be requested to only account for and report the new ones The knock-on consequence of such exclusions would be a minor increase in the costs applicable to enterprises with over 10 employees, with those over 250 employees facing the largest additional burdens. Additionally, reporting obligations have been targeted to revise existing obligations in the first place to make them more fit for purpose and improve the knowledge base for the textile sector overall.

Step 4/4: Minimising negative impacts on SMEs

Following the assessment of the composition of the textile sector, the process for designing the measures as part of all the policy options involved a systematic consideration of the ways how to reduce the impact on SMEs while not compromising on their contribution to the attainment of the policy objectives.

The textiles industry is dominated by SMEs. The most-costly proposed measure – the application of EPR – excludes micro-enterprises that comprise approximately 88% of the sector are proposed to be excluded. The greatest knock-on consequences of their exclusion would be an increase in costs in enterprises with greater than 250 employees by approximately 7 percentage points in comparison to a situation whereby micro-enterprises would be included. These costs are not expected to impact on competitiveness given their relatively low level.

2- Food Waste

Step 1/4: Identification of affected businesses

Processing and manufacturing:
The EU food and drink industry is comprised of 290,000 SMEs – making up 99% of the entire industry. SMEs employ 2.8 million people out of 4.5 million for all businesses and generate over 40% turnover of the sector.

Food services sector

Eurostat Structural Business Statistics does not single out food services but provide data for sector on accommodation and food services jointly. Therefore, these data should be treated as illustrative.

Table 53 Services by employment size class

Size of enterprise	Number of enterprises	Persons employed
2-9	790 000	3 067 000
10-19	652 226	1 570 046
20-49	32 286	930 000
50-249	7 000	642 000
250 +	939	938 800

Source: Eurostat Structural Business Statistics and Eurostat Statistics Explained.

The enterprise size structure of the EU's accommodation and food services sector would appear to be dominated by SMEs (small and medium enterprises) employing less than 250 persons. These enterprises together employed 85.7 % of the EU's accommodation and food services

employment in 2019 and generated 77.1 % of its value. The importance of large enterprises (employing 250 or more persons) was relatively small, with only 14.3 % of the EU's total employment and 22.9 % of its value added in the accommodation and food sector.

The share of micro enterprises was particularly high for the EU's food and beverage services subsector, generating 35.4 % of the value added and contributing to 43.6 % of the total employment in this subsector in 2019.

To what extent is the initiative relevant for SMEs?

This initiative is considered as potentially **relevant** for SMEs.

The scope of the legislative proposal in the area of food waste is limited to setting food waste reduction targets on the Member States. Therefore, the proposal will not impact businesses directly.

The proposal does not include any new obligations for action by Member States other than those already established by Waste Framework Directive (reducing food waste at each stage of the food supply chain, preparing food waste prevention programmes, implementing related actions, monitoring and reporting on progress achieved). Moreover, Member States have already committed to take action to reduce food waste in order to contribute to SDG Target 12.3.

It can be expected that more active implementation of prevention policies by Member States will have indirect impact on SMEs in the food sector by modifying their business environment, especially in the longer term. In implementing national food waste prevention programmes, Member State authorities will likely engage with all actors in the food supply chain in order to ensure progress towards the national targets. It is also possible that Member States can take measures directly aimed at SMEs, although this is very unlikely.

See Annex 7 and Annex 10 (Section 2.4) to see examples of actions taken by Member States which have already started implement food waste prevention policies. The majority relies on voluntary measures, encouraging food business operators to better cooperation and providing them with tools and information for that purpose. The only exception was France which introduced legislation requiring an obligatory agreement on food donations, however addressed only to larger companies, not considered as SMEs.

It is generally regarded that food business operators have an inherent economic incentive to reduce food waste as it impacts directly on their profits. Moreover, numerous business cases shows that more insight on food waste generation in their operations, measurement of food waste and taking action to address hotspots brings significant savings, with some reports indicating average benefits-cost ratio of 7:1 or even more. Similar business cases analysis covered hotels The Business Case for Reducing Food Loss and Waste: Hotels | Champions 12.3 (champions123.org), catering The Business Case for Reducing Food Loss and Waste: Catering | Champions 12.3 (champions123.org), The Business Case for Reducing Food Loss and Waste: Restaurants | Champions 12.3 (champions123.org) or food business in general The Business Case for Reducing Food Loss and Waste | Champions 12.3 (champions123.org).

Therefore, the focus on actions observed so far in Member States and neighbouring countries (United Kingdom, Norway) which have undertaken coordinated action to reduce food waste, focused on actions encouraging food waste prevention (voluntary agreements, exchange platforms etc.) supported by financed by government financing.

Examples:
United Kingdom: Guardian of Grub
The Netherlands: https://nowastenetwork.nl/?lang=en

So far, the only country that has introduced obligations in national legislation to support food waste prevention are focussed on requirements related to food donation as well as diagnosis and monitoring in sectors of restaurants is France.

On food donation, French legislation[174] bans the destruction of edible food and obliges businesses to sign a food donation agreement with authorised charitable organisations. This requirement applies to retailers (for larger shops, if >400m²), food and drink industry and wholesale (if >50M€ turnover) and collective catering (if >3000 meals/day) sectors. On diagnosis and monitoring, government requests diagnosis and action plans for the entire collective catering sector. The government provide guidance and tools to enable companies make their own diagnosis and implement results of their diagnosis as feasible for business operator. There is no minimum threshold for companies (so SMEs are included), but there are no consequences for late or no delivery. The Impact Assessment related to the French legislation[175] does not expect any additional costs for enterprises but rather improvement of their competitiveness and public image.

Step 2/4: Consultation of SME Stakeholders

Full description of consultation activities is in the Annex 2.

The stakeholders were consulted through public and targeted consultations to gather views and feedback in view of further developing and fine-tuning the different initiatives.

A set of targeted consultation activities with stakeholders focused on surveys on costs and benefits on food waste prevention actions.

Consultations with food business organisations represented in the EU Platform on Food Losses and Food Waste: There is no dedicated organisation representing SMEs directly. Instead, SMEs are represented by sector-specific organisations. The Platform covers the whole food supply chain from primary production, through processing and manufacturing, retail and distribution, restaurants and food service, until households. SMEs are well represented by the organisations representing specific sectors of the food chain, notably: EuroCommerce, Independent Retail Europe, HOTREC (food services, 90% of micro enterprises) and FoodDrinkEurope.

Public consultations included questions regarding options and measures for prevention of food waste. No specific impacts or challenges related specifically to SMEs have been identified. Analysis of replies and position papers, showed no significant differences between different size-classes of food business operators, including SMEs (i.e., micro, small, medium). As the current legislative proposal does not include any measures directly relevant to food business operators but will instead put obligations on Member States, there was no specific feedback received from

[174] Ordonnance n° 2019-1069 du 21 octobre 2019 relative à la lutte contre le gaspillage alimentaire
[175] https://www.legifrance.gouv.fr/contenu/Media/Files/autour-de-la-loi/legislatif-et-reglementaire/fiches-d-impact/fiches-d-impact-ordonnances/2019/fi_agrg1920827r_25_09_2019.pdf

SMEs on the problems and the proposal, but a general call to support SMEs in their actions to reduce food waste.

The **main challenges perceived by small businesses** are lack of information as well as staff and resources to integrate food waste prevention practices and introduce measurement tools. SMEs also highlight the need for financial support (e.g., tax incentives on donation, reduction of waste management fees) as well as for targeted information campaigns and guidelines on how to avoid food waste, including how to deal with food surpluses and especially with food donation. (As indicated in EU guidelines on food donation, that the recovery and redistribution of surplus food from the hospitality and food services sectors is more limited due to food safety restrictions, and some Member States provide specific guidance in this regard). Such information campaigns and guidelines should be prepared at national level, to take into account specific national legal, institutional and business environment.

Step 3/4: Assessment of the impact on SMEs

The impact assessment included activities to collect information about the costs and benefits of food waste prevention actions (see step 2).

The distribution of costs and benefits for each policy option are expected to be similar regardless of business size. Analysing Member States policies so far, it may be expected that the breadth of Member States' policy response will widen (involving a wider spectrum of food business operators) with increasing food waste prevention target levels. However, it is likely that any regulatory obligations / voluntary agreements will be imposed first on large operators, responsible for generating a high share of food waste and able to implement food waste prevention in cooperation with both their suppliers and customers. Similarly, measures taken by food business operators to support consumer behavioural change (notably at retail) are often led by the large players.

The analysis of impacts is done by modelling food and connected sectors. It is generally assumed that food waste reduction will lead to decreased demand on food which should lead to lower prices and higher availability of food. This in turn can reduce jobs on food production across the economy, which may also be offset by jobs created through the need for new service providers related to food waste prevention (e.g., repurposing and/or valorisation of food surplus).

The results of simulations done with the MAGNET model show that the most negatively affected industries[135] would be food manufacturing, waste collection and treatment and food services. Still, the expected impact on SMEs' employment in the above-mentioned industries would be rather small. On the other hand, on average, the remaining industries would experience a small positive impact related to food waste reduction. The cumulative difference would be very small. For instance, even for the highest reduction targets, the cumulative difference in the value of production between the baseline and the policy scenario would be less than 1 percentage point during the 2020-2030 period. It should be noted that SMEs may be impacted by other related legislation currently in force, which is expected to have an indirect effect on food waste generation. For example, taxes on landfilling may lead to a rise in waste collection costs, which may be perceived as additional cost for SMEs, but such measures are not part of the current proposal.

Step 4/4: Minimising negative impacts on SMEs

The experience from leading countries as well as studies conducted demonstrate that the success of food waste prevention initiatives depend on the engagement of key players involved. Both management and staff usually want to help reduce waste but require clear guidance. Therefore, measures implemented by countries so far have focused on the voluntary involvement of SMEs. Bearing that in mind, no dedicated mitigating measures are envisaged in the legislative proposal.

Financial assistance (in form of grants) is currently offered at EU level, in order to support development and dissemination of best practices in the food chain. The grants implemented thus far by the Commission, under the Single Market Programme, have targeted SMEs in order to address their specific needs.

The further exchange of knowledge, best practices, tools, guidelines and experience will continue via the EU Platform (including its sub-groups) and the dedicated website (EU Food Loss and Waste Prevention Hub). The support would cover in particular the areas of measurement (e.g., how to make it cost-effective), food services (meeting consumer needs), prevention of food waste at consumption (and its implication for SMEs), case-studies (including cost-benefits). These could also lead to specific recommendations from the Platform towards Member States on how potential impact of food waste reduction targets on SMEs could be mitigated.

ANNEX 16: RELATED STAKEHOLDER AND CITIZENS' ENGAGEMENT

The **Conference on the Future of Europe** took place in April and May 2022. It enabled people to share their ideas on what they expect from the European Union and led to a final report consisting of 49 proposals. As regards food waste, proposal no.1 related to agriculture, food production, biodiversity and ecosystems, pollution includes following a measure to 'apply: Apply circular economy principles in agriculture and promote measures against food waste'.

Topic "climate change, environment", proposal no. 5 concerns sustainable consumption, packaging and production. The main objective of this proposal is to build a circular economy by promoting sustainable EU products and production and more circular, autonomous and less dependent materials within the EU. For this reason, the said proposal includes, among others, the following measures:

- Stricter and harmonised production standards within the EU and a transparent labelling system for all products sold on the EU market regarding their sustainability/environmental footprint, as well as longevity, using a QR-code and eco-score, or the Digital Product Passport.
- Further avoid waste by setting prevention and reuse targets and setting quality standards for waste sorting systems.
- Launch an EU knowledge platform on how to ensure long-term and sustainable use and how to "repair" products, including the available information from consumer associations.
- Introduce measures to tackle early, or premature (including planned) obsolescence, ensure longer warranties, promote a right to repair, and ensure availability and accessibility of compatible spare parts.
- Establish a secondary raw materials market, also by considering requirements for percentages of recycled content and encouraging less use of primary materials.
- Rapid implementation of an ambitious sustainable textile strategy and setting up a mechanism ensuring consumers can be aware the product meets sustainable criteria.
- Take EU actions that enable and incentivize consumers to use products longer.
- Stricter manufacturing standards and fair working conditions throughout the production and entire value chain.

As a follow-up to the Conference on the future of Europe, the Commission announced **a "new generation" of citizens' panels** to consult randomly selected citizens before certain key proposals at the European level. Food waste was selected amongst the three first topics (along with virtual worlds and learning mobility) to be addressed by citizens, with the panel convened for three sessions held from December 2022 to February 2023. Although the Citizens' panel was not part of the consultation activities organised for the purpose of this Impact Assessment, citizens' recommendations[176] will support the Commission's work related to food waste prevention and have been considered in the preparation of the legislative proposal setting EU-

[176] European Commission, European Citizens' Panel on Food Waste Final recommendations February 2023, flw_eu-actions_fwrt_20230210_recom-cit_0.pdf (europa.eu).

wide food waste reduction targets. Importantly, citizens' recommendations will serve as a guide to help Member States in achieving the EU food waste reduction targets.

1- Citizens' Report from the European Commission's citizens' panel on food waste

Following up on the final recommendations of the Conference on the Future of Europe, in its Communication "Putting Vision into Concrete Action" (of 17 June 2022), the Commission committed to enabling citizens' panels to deliberate and make recommendations ahead of certain key proposals.

The first of this **new generation of citizens' panels** was organised by the Directorate-General for Health and Food Safety and the Directorate-General for Communication between 16 December 2022 and 12 February 2023 on **reducing food waste**. The panel was convened against the background of preparatory work for the proposed *revision of the Waste Framework Directive (WFD)*[177] for which the Commission considered the feasibility of setting legally binding food waste reduction targets to be met by Member States by 2030.

I. The Panel

The panel was **composed** of 147 randomly selected citizens reflecting the EU's diversity in terms of age, gender, socio-economic background, education and geography (nationality and urban/rural residency). Citizens met for three weekends to formulate recommendations on how to step up action to reduce food waste in the EU.

They were **aided** by professional moderators and facilitators, Commission experts and a Knowledge Committee including external experts.

The panel's deliberations focussed on the overall aim of the proposal – to accelerate food waste reduction in the EU – and the future implementation of such EU legislation. The citizens' panel aimed to sound the views of citizens on actions to be taken by Member States, actors in the food supply chain, citizens and other private and public stakeholders, in order to step up efforts to reduce food waste and achieve future targets.

II. The Recommendations

In their work to develop the recommendations, citizens showed a **high level of commitment and engagement.** During the first panel meeting, citizens raised over 80 questions – many going beyond the topic of food waste and focussing on the functioning of food systems more generally – which were addressed by experts. Citizens wanted to **strengthen their voice and participation in EU food policy** and also called for the establishment of local and national citizen engagement fora. They were interested in the next steps and ways to continue their work on the topic of food waste, with some suggesting citizens' closer involvement in EU research on food waste or to be represented when the legislative proposal is discussed in the European Parliament. They also expressed their wish to give **further visibility and coverage to the citizens' panel** and embraced their own role as **ambassadors of food waste prevention** and agents of change within their respective networks.

[177] The proposed revision of the Waste Framework Directive covers both food and textiles waste.

The 23 recommendations of this panel – as listed in the annex - take **a broad food systems approach**, seeking to engage all actors and strengthen collaboration across the food supply chain. This **comprehensive approach** is also reflected in the three topics addressed by the citizens' recommendations: 1) Cooperation in the food value chain: from farm to fork; 2) Food business initiatives and 3) Supporting consumer behavioural change.

Citizens' recommendations associate food waste reduction with a **fair, equitable food supply chain that ensures solidarity** (e.g., supporting local producers and addressing unfair trading practices that can lead to food waste such as last-minute order cancellations). In the light of growing challenges to food security, they recommend mechanisms to facilitate the redistribution of surplus food to those in need (e.g., networks and digital solutions connecting food business donors with food banks and charities) and call for broadening the definition of food waste to include food left unharvested and encourage gleaning.

The recommendations reaffirm the need for an **evidence-based approach** to guide effective food waste prevention by all players, highlighting the importance of monitoring. They also recognise the need for the EU to set **an overarching goal** to reduce food waste, with Member States taking steps to ensure that the goal is met. The **role of education** on food and, in particular, food waste is prominent, receiving the highest level of endorsement from citizens. Citizens call for the integration of food education in school curricula to help build understanding and appreciation of the value of food from an early age.

III. Next steps

Some recommendations reflect the European Commission's **ongoing work** with Member States and stakeholders to fight food waste across the EU, confirming and supporting the need for EU-level action in this area. For example, citizens recommend **sharing data and best practices** in food waste prevention among relevant stakeholders – which is a core part of the mandate of the EU Platform on Food Losses and Food Waste, established in 2016. The EU's Code of Conduct on Responsible Food Business and Marketing Practices, adopted by stakeholders in 2021, encourages **concrete commitments from food businesses**. EU guidelines to facilitate food donation[178] can support the implementation of harmonised approaches by Member States, as suggested by EU citizens.

Citizens also request action to help consumers prevent food waste including both national and EU-wide campaigns to inform about the related economic and environmental benefits and involving food business operators. As consumers, citizens want support in making their own informed decisions about how to consume and use food in relation to 'use by' and 'best before' dates. Addressing consumer food waste is an important part of the Commission's work and – in line with citizens' expectations – will continue to be a key area of action. A key example of this is the European Consumer Food Waste Forum[179], which is working to find solutions and develop tools to help reduce consumer food waste.

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[178] OJ C 361, 25.10.2017, p. 1–29

[179] European Commission, EU Project: *European Consumer Food Waste Forum*, October 2021 - July 2023.

Citizens' recommendations also indicate **points for further consideration**, such as, taking measures to forbid the destruction of safe, surplus food. Although already reflected in the waste hierarchy (enshrined in European waste legislation[180]), this principle could be further considered in the Commission's work to establish sustainable food systems to ensure that more food produced is utilised for human consumption. Another area of further work, highlighted in the recommendations, is that of research on innovative and sustainable packaging. Furthermore, the recommendations also **reveal some areas for possible future action** by the Commission, Member States and other players, such as the need to improve outreach and engagement with citizens across the EU. Many citizens were not aware of the extent of food waste and related negative impacts before their involvement in the panels nor of ongoing work to reduce and prevent food waste carried out in their respective Member States, for instance, in the context of the International Day of Awareness of Food Loss and Waste. The Commission will continue working with Member States and stakeholders to further build awareness and support behavioural change as regards food waste.

With regard to the European Commission's policymaking, the **outcome of the citizens panel will support the overarching work of the Commission on food waste** and **serve as a guide to help Member States in achieving the future targets**. The recommendations complement the impact assessment and the public consultation carried out by the Commission to support the setting of legally binding food waste reduction targets and they have been considered in the preparation of this initiative. Moreover, citizens' recommendations will be shared and discussed with the EU Platform on Food Losses and Food Waste, bringing together Member States and stakeholders, so that they may consider these in their food waste prevention programmes. Citizens will be kept informed of key EU developments in food waste prevention, such as the adoption of the legislative proposal.

"It was amazing to cooperate with people from all over the EU and see the vast majority is interested and is trying to find the right way to improve the situation with food waste."

Lucie, 40, Czech Republic

[180] OJ L 150, 14.6.2018, p. 109-140

FINAL RECOMMENDATIONS OF THE EUROPEAN CITIZENS' PANEL ON FOOD WASTE

No.	Title of the recommendation	In favour	Against	Abstained
1	The closer the farmer, the happier the consumer: Less waste, more sustainability	120	15	5
2	Tastes of home: Public and private support for local farming to reduce food waste	119	9	12
3	Share don't waste!	93	31	16
4	Sharing of data and best practices across Europe	97	27	16
5	Gathering data across the food supply chain	101	28	11
6	Citizens' voices matter: Citizen participation in European food policy	91	37	12
7	Just picked: The value of seasonal food	103	26	11
8	EU-wide food exchange network	84	41	14
9	Planned purchases and redistribution	85	38	16
10	Restaurants stand for "enjoy without wasting"	113	17	9
11	All waste has a weight	73	48	18
12	A mandatory reporting system for transparency coupled with penalties and rewards	68	56	15
13	EU-wide legislation on the destruction of unsold food products - a peer learning approach across Member States	109	20	10
14	Transparency on food waste for visibility and action	102	22	15
15	Innovation in packaging and use of packaging when needed	116	18	5
16	Broadening the definition of food waste in order to save unharvested food	110	19	10
17	Encouraging adults to take action on food waste as a priority	113	20	6
18	Nutritional awareness and sustainable food in primary and secondary schools	123	9	7
19	Promote and support food sharing applications and platforms connecting consumers with each other	97	25	17
20	Save food, save money: A European campaign against food waste in cooperation with food retailers on four weekends a year	98	31	10
21	"Stop food waste": A week of food waste awareness at school	116	16	7
22	To provide consumers keys to be aware and independent on their impact on food waste and to understand how to process, preserve and reuse a product before and after the date has passed. ("use by" date is a safety date after which a product should not be consumed; "best before" indicates the date until which a product keeps its optimal quality)	108	26	5
23	The implementation of standardized practices at the retail level when promoting to consumers products close to the expiration date.	109	18	12

Recommendations (full text) as formulated by participants of the European Commission's citizens' panel on food waste

TOPIC BLOCK I – COOPERATION IN THE FOOD VALUE CHAIN: FROM FARM TO FORK

RECOMMENDATION 1 **The closer the farmer, the happier the consumer: Less waste, more sustainability**
We recommend that the EU continues its work with policies and initiatives to support small-scale producers in their trade with retailers and supermarkets. Large retailers/processors have a clear power advantage in this relationship, and often steer the trade in their favour, sometimes resulting in food waste. Three aspects need specific attention: 1) The EU and its Member States should encourage retailers and supermarkets to always source from the closest producer possible. Furthermore, they should investigate and develop incentives that motivate retailers to follow these recommendations. 2) The EU needs to monitor and track the ban on last minute cancellations from 2019 and be ready to intervene if it is not followed. 3) The EU needs to continue working with policies on ugly/misshaped food and investigate further the consequences in relation to food waste when such products are rejected.
Rationale/justification Supporting small-scale producers and their sales in close proximity have high potential to reduce food waste in several ways, both along the value chain and in households: - When transportation of food is long and supermarkets try to be cost efficient by increasing volumes, food waste is likely. - Local producers can be more adaptable and respond faster to changes in demand, which can reduce waste. - Food from nearby producers is often of higher quality and longer lasting, which can result in less waste in households. - Food currently disposed of due to its wrong shape can be avoided. - Food waste due to last minute cancellations can be avoided if more comprehensive

regulations and frameworks supporting small producers are in place.

Additional notes
Positive influence on food security and health.

Emphasizing the importance of combining this recommendation with other initiatives focusing on consumer behaviour, public awareness, and education to strengthen the cooperation between stakeholders and improve the general understanding of food waste and its relation to local food production.

Challenges:

- Trade-off with EU principle on free trade and free market, therefore it can be opposed by large corporations/retailers and lobbyist groups.
- It is important to consider and discuss what is “local” and what is a “short supply chain” when working further with this recommendation, since there is no common definition for this at EU level.
- Seasonality of products and demand of consumers can challenge a potentially limited supply due to focus on food from short food chain.

RECOMMENDATION 2

Tastes of home: Public and private support for local farming to reduce food waste

We recommend local & regional authorities to support local farmers with practical solutions and initiatives aimed at reducing food waste. The goal is to encourage stakeholders to cooperate more closely to drive these initiatives and thereby create a sustainable food system that benefits both farmers and consumers.

Several initiatives are suggested for local authorities to initiate:

1) Tax reliefs and subsidies for small scale farmers.

2) Support local farmers in finding new markets where they can be protected from unfair power relations with retailers, for example by allocating public spaces for sales.

3) Encourage inclusive processes and initiatives with value chain stakeholders for the work with food waste, for example by promoting the use of "food waste apps" in a city.

4) Support associations and other actors that are supporting local farmers in food waste issues, such as food banks.

Rationale/justification

Supporting small-scale producers and their sales in short proximity have high potential to reduce food waste in several ways, both along the value chain and in households:

- When transportation of food is long and supermarkets try to be cost efficient by increasing volumes, food waste is likely.
- Local producers can respond faster to changes in demand, and be more adaptable to changes, which can reduce waste.
- Food from local producers is often of a higher quality and lasts longer, which means that shortening the value chain would reduce waste both at the transport and household level.

Additional notes

- Emphasizing the importance of combining this recommendation with other initiatives focusing on consumer behaviour, public awareness, and education to strengthen the cooperation between stakeholders and improve the general understanding of food waste and its relation to local food production.

Main challenges

- Large scope and complexity of the recommendation. It will take time to analyse and implement many of the suggested initiatives, and it requires solid monitoring systems.
- Trade-off with EU principle on free trade and free market which can challenge the initiative and its acceptance by different stakeholders.

RECOMMENDATION 3

Share don't waste!

We recommend that food banks, and redistributors in general, should be financially supported at a basic level by governments through a structural scheme common across Europe, instead of primarily working by private donations (but not 100% funded, so it does not turn into a business). We also recommend a platform that connects the various existing apps that connect retailers to food banks. The platform should be user-friendly, efficient, and managed centrally. We also recommend that the food redistributed (donated or sold at a lower price) from retailers to food banks is given away in good time and good condition, preferably 3-5 days before it goes bad (rather than the current 48-hour guideline). The incentive to do this could be a tax deduction for retailers, that decreases the closer the redistribution is to the items' expiration date. They must donate a minimum amount of food to be eligible for this deduction.

Rationale/justification Since food waste cannot be completely avoided in the current system, we should at least work to save the food that is wasted. In this context, we should utilise all the tools already available (food banks, applications, relevant associations, initiatives, etc.)
Additional notes A challenge is how to strengthen the capacity of the food banks without making them into a business industry (as we rather want to handle food waste upstream).

RECOMMENDATION 4 **Sharing of data and best practices across Europe**
We recommend that governments in each country share their data and best practices on actions to target all steps of the food waste chain, from producers to consumers, to the European Commission's platform for food waste (EU Platform on Food Losses and Food Waste). This information will then be managed and analysed by a special committee of EU researchers that work to promote the good practices and make them easily accessible. The data on good practices should be categorized by types of production and types of consumption. In addition, we want to promote a network of cities/regions which access the data and utilize the practices that work best for them, based on similar consumption and production patterns. The network is set up for these localities to learn from each other based on these similarities. The concept of "twin cities" could be applied for this purpose: cities with similar food waste issues work together to solve them.
Rationale/justification Best practices could be shared more efficiently and consistently. Also, this would utilise both the EU Platform on Food Losses and Food Waste, the Eurocities and “twin cities” concept. We want to empower the collaboration of cities and regions across Europe.
Additional notes

RECOMMENDATION 5

Gathering data across the food supply chain

We recommend that data on how, where, who, why, and when food waste occurs across the food supply chain gets collected by an EU body or other agencies or research institutions. This could be through:

1) Individual consumer behaviour through app measurement.

2) Face-to-face collection of data, through the Eurobarometer survey.

3) Surveys sent to schools and other educational organizations. Could be before/after a school intervention targeting food waste.

4) The use of citizen panel citizens as a representative cohort for research purposes.

5) Journalling study of consumer behaviour could be an intervention study. Inspiration from consumer scan panels of BE/NE.

6) The use of scientifically validated measures from universities.

7) Observational studies – specifically studying actual waste amounts by drawing on existing waste management processes of towns and municipalities.

8) Collecting and comparing invoices from supermarket/farmer interactions.

9) Standardizing forms for reporting waste.

Rationale/justification

We recommend this because if we know where, when, and why we are wasting food, we can launch more targeted awareness raising campaigns, and provide a detailed insight on where we could have the biggest impact on the reduction of food waste. Our group believes that by collecting more accurate data about where exactly in the food chain food is wasted, then we will be able to address our solutions to food waste more effectively. The current common methodology for collecting EU data on food waste (as defined by the Commission Delegated Decision (EU) 2019/1597) focuses on measuring the amount of waste, whereas the aim of our proposal is to gather more detailed data on the who, when, and where of food waste. These additional data-gathering projects/initiatives could be used to supplement the quantitative data gathered in the new yearly reporting by Member States. They would provide more specific data on the "what, how, who, when and where" of food waste.

Additional notes

Notes on data we want collected: We should collect data on the "what, how, who, when, and where" of food waste. **What/When:** What food are we wasting and in what circumstances? What exactly are people throwing away - how many grams are left on the plate? Data on how much we buy vs. how much we throw away. **How:** How is it wasted - is it thrown away? Is it cooked too late/spoiled/out of date? Did we buy too much? Cultural differences could also be considered. **Who:** Who in the supply chain wastes food - distributors, consumers, etc? At consumer level, is there a breakdown of which consumers are wasting the most food - this could be linked to age or country? (Note: will people want to provide this data?).

Relating to point 5): The name of the company we're drawing inspiration from is Growth for Knowledge/GFK.

The group believes that respecting the privacy and personal data of European citizens is very important. Any studies conducted based in our recommendation should respect this.

RECOMMENDATION 6

Citizens' voices matter: Citizen participation in European food policy

Building on the Conference on the Future of Europe and the current EU Citizens' Panel on Food Waste, we recommend the establishment of local and national citizen engagement fora. These fora would be tasked with following, monitoring and offering advice on national strategies to implement EU directives on reducing food waste from the perspective of citizens. We further recommend that the EU Platform on Food Waste should include citizens' representation and engagement that coordinates exchanges between the engagement fora. At both national and EU levels, the fora should offer a platform for information sharing and mutual learning between citizens/ consumers, stakeholders, and policy makers.

Rationale/justification

We offer this recommendation because it is important to give voice to citizens, ensure a fair and transparent process, and to allow citizens and decision makers to coordinate and learn from each other. Citizens are experts on their own lives, and their perspectives must be considered at local, national, and EU level.

Additional notes

RECOMMENDATION 7 **Just picked: The value of seasonal food**
We recommend a change in consumer habits by informing consumers of the value of seasonal food. This should be done through clear signs in stores that allows consumers to clearly identify seasonal produce. Information about seasonality should also be communicated to a wide audience through public information campaigns. Informing consumers through signs on shelves and campaigns may incentivize producers to grow seasonal produce. We further recommend the production of better data on the most effective methods for incentivizing production of seasonal produce and limiting the import of non-seasonal low-quality foods.
Rationale/justification We offer this recommendation because non-seasonal food is often imported and/or of worse quality than seasonal foods. Higher quality produce can impact consumer behaviour, as we tend to value higher quality food more, thus wasting less.
Additional notes

TOPIC BLOCK II - FOOD BUSINESS INITIATIVES

RECOMMENDATION 8 **EU-wide food exchange network**
We recommend major distributors to be directly connected through a register on an EU-wide website that allows the exchange of about-to-expire or surplus food. The webpage would prevent food waste by enabling communication within the levels (see below) and the next sectoral unit in the supply chain. Businesses can sign up and offer or buy surplus food at a lower price. There would be three levels: 1. Level one would consist of producers, farmers, and distributors. 2. Level two would incorporate supermarkets, food banks, and community kitchens. 3. Level three encompasses consumers and households.
Rationale/justification

Citizens did not provide a rationale.
Additional notes

RECOMMENDATION 9 **Planned purchases and redistribution**
We recommend developing a legal framework to harmonise Member States' legislation on practices for the entire supply chain regarding the redistribution of surplus and about-to-expire food, considering safety regulations and data forecasting. Purchases should be adjusted to what will be sold. Supermarkets and suppliers could be incentivised with benefits (for example, through tax breaks) for selling at a lower price or donating.
Rationale/justification Citizens did not provide a rationale.
Additional notes

RECOMMENDATION 10 **Restaurants stand for "enjoy without wasting"**
We recommend to the European institutions the following plan to reduce food waste in restaurants. Once certain quality criteria (like the ones outlined below and some others) are met, all types of restaurants should be allowed to show a logo (which is harmonised across the EU). The logo would advertise the possibility to take leftovers home and waiters should provide packages for food to take leftovers home. Those restaurants that implement the logo plan would write on their menus an additional text stating “you can take your leftovers home”. If there are still leftovers of prepared food, they should be offered to employees. If there are leftovers of raw food from the kitchen, they should be offered to Food Banks/other charity institutions. If food is inedible, it should be used to produce renewable energy. To encourage restaurants to meet these quality criteria (or further quality criteria), financial support should be given to restaurants to carry out this plan. A tax relief could serve as a financial incentive and additional aid could be granted. As leftovers from kitchens can

be weighed or measured, they could be monitored and taken into consideration for the tax relief.

Rationale/justification

We recommend this because it would reduce food waste coming from restaurants and significantly reduce the shaming effect which might occur when asking for leftovers. If restaurants act as role models, private households will be encouraged to reduce food waste as well.

Additional notes

RECOMMENDATION 11

All waste has a weight

We recommend that organisations in charge of waste management be obliged to weigh, scale or measure organic waste. In the short term, the plan should focus on public institutions (e.g., schools and hospitals), entire neighbourhoods or districts, and in the long-term, it should also include private households. Representatives of these institutions/districts and, at a later stage, private households should regularly receive reports and comparisons to previous periods and comparisons to other entities. This leads to more awareness and is an incentive to reduce food waste. It does not have to be measured in the same way in all countries, it is sufficient if it is comparable in a respective country.

Rationale/justification

We recommend it because it would broaden awareness among consumers. It would also serve as an incentive to improve and reduce food waste. The results of the recommendation can be measured in the short and long term, providing some motivation to reduce food waste.

Additional notes

RECOMMENDATION 12

A mandatory reporting system for transparency coupled with penalties and rewards

We recommend establishing a reporting system (especially similar to ISO certification) to set specific standards across the whole value chain including producers, manufacturers, retailers, supermarkets, restaurants, and hotels. It should distinguish between large and small/medium size enterprises (SMEs) based on existing categories to classify company sizes. There should be penalties if standards are violated and rewards if companies overperform. There should be a relative fine system proportional to the gravity of the offense and the size of the company. Rewards should primarily be based on a label system, for example, ABC grades, or potentially financial incentives, especially for SMEs. Independent and external auditors must be tasked with reporting, not the companies. Public authorities at the member-state level (e.g., ministries or regulatory bodies) are in charge to ensure implementation and monitoring. The data should be publicly accessible and enable peer learning. The Commission should have an oversight and coordination function.

Rationale/justification

It is important for transparency purposes to have the data of the labels available and accessible for people who wish for more information than just a label.

Additional notes

RECOMMENDATION 13

EU-wide legislation on the destruction of unsold food products - a peer learning approach across Member States

It must be ensured that food products are used in different phases before being thrown away. The priority is on avoiding food waste, but if not possible, the following cycle applies: human consumption, animal consumption, biofuel, and composting. The Member States are responsible for the required infrastructure to be in place to enable implementation. The EU sets an overarching goal to reduce food waste by a certain percentage. Member States set national standards so that the EU goal is collectively achieved. Member States can implement either voluntary or mandatory measures for companies to comply with. The reduction needs to be quantifiable. After a pilot phase that focuses on supermarkets, and adjustments based on peer learning, the best practice should be a guideline for all Member States.

Rationale/justification
The French example does not work, so we need a better solution, for example a platform like in Finland, where companies can upload food that would go to waste. A law forbidding food waste needs to be kept general to account for diverging cultures of Member States.

Additional notes

RECOMMENDATION 14

Transparency on food waste for visibility and action

We recommend that all participants in the food supply chain, except individual households, should have an obligation to measure and report transparently on dealing with food waste and its handling. Further emphasis should also be on the need for new options for data collection as well as including the food loss in the agricultural sector.

Furthermore, differentiated incentives to promote voluntary agreements should follow to support institutions in playing a pioneering role. Also, corrective measures contribute to the importance, geared towards including all participants in the food supply chain (except individual households).

The EU should do a best-practice evaluation of the different Member States about their existing reporting structures and incentives as well as corrective measures. This helps to establish a further embedded framework for the EU to make data more comparable.

Rationale/justification
We recommend this because the awareness of existing food waste is the basis to apply further approaches, such as incentives, innovative voluntary agreements, and corrective mechanisms to avoid food waste.

Additional notes
As an example of incentives, an EU-wide labelling technique could be used to benefit from marketing strategies. Another example could be appropriate financial compensation for reducing food waste.

RECOMMENDATION 15

Innovation in packaging and use of packaging when needed

We recommend investing further in scientific research on innovative and alternative sustainable ways of packaging. This helps to increase the life span, improve the package size to reduce food waste, and ensure better food safety for its transportation. The EU should support this financially and politically through appropriate programs, such as the funding of start-ups and smaller innovating forces. Furthermore, we recommend supporting retailers to sell food without packaging, where it is possible, without compromising food safety.

Rationale/justification

We recommend this because we still rely heavily on the packaging, particularly concerning transportation and food safety. Therefore, we believe that supporting innovations (research/ start-ups) in environmentally sound packaging can contribute towards this. On the one hand, adjusting the sizes of packaging of perishable food would reduce food waste, whilst considering the risk of increased packaging waste (whereby research mentioned above, should aim at preventing this). On the other hand, the individual portions should be offered, where one can bring his/her own container (also to reduce food waste, as well as waste of other kinds). If we develop a structure of environmentally friendly packaging and its infrastructure is adapted, ultimately, consumer acceptance can be achieved.

Additional notes

TOPIC BLOCK III - SUPPORTING CONSUMER BEHAVIORAL CHANGE

RECOMMENDATION 16

Broadening the definition of food waste in order to save unharvested food

We recommend that unharvested food should be integrated in the European definition of food waste. We also want farmers to have the possibility to commercialize less-than-perfect but still edible products. To avoid food loss, farmers should get signs which announce that unharvested food may be harvested by private households and NGO's.

This idea must be communicated to two groups:

- to citizens via the campaign that is developed in recommendation 20
- to farmers via the Member States' ministries for agriculture. The latter should implement this recommendation in coordination with local municipalities and producer unions.

Rationale/justification
We recommend this because it is unreasonable to waste edible food. Direct harvesting helps recognize the work that farmers do and value the food they produce.

Additional notes
A challenge is that we don't want to blame farmers.

RECOMMENDATION 17

Encouraging adults to take action on food waste as a priority

We recommend that each Member State should implement a program for adults to raise awareness and knowledge about the cost of food waste and the benefits of preventing it at national, regional, and local level.

This should be based on best available data (recommendation 5) to underline the urgency of the problem. It should include apps (recommendation 18), campaigns (recommendation 4 and 20), further education and training for people working in the food industry, in-house training programmes for professionals as well as documentaries and television programs on the topic. Some possibilities could be short ads showing the benefit of reusing food, promote Sunday as leftover day, and create game shows with cooking competitions for young adults to involve the broadcasters.

Informing people, through simple messaging or nudges, about the economic and environmental benefits of not wasting food is important.

A key contributor to the dissemination of information could be the media, especially public service radio stations and television, print media, social media, public institutions, museums, and retailers. Existing EU institutions could develop resources to support Member States (for example, the House of European History).

Rationale/justification
We recommend this because other recommendations deal with children's education, but we also need actions that have an immediate short-term effect on the current buying and cooking generation.

Additional notes
A benefit is that anti-food waste nudges used in supermarkets will balance the marketing that persuades people to buy too much.

RECOMMENDATION 18

Nutritional awareness and sustainable food in primary and secondary schools

We recommend the inclusion of the topics of sustainable food and nutrition in primary and secondary schools' curricula, either through the creation of new mandatory standalone courses, as they already exist in some countries, and/or their inclusion in existing mandatory subjects. This recommendation aims to increase pupils' awareness of food waste through discussions on socio-economic values, sustainable production and consumption, shopping behaviours, household economics, and practical experiences bringing schools and farms closer together. To make this recommendation happen, there are two preconditions which we expect the EU to enact. Firstly, we need a multi-stakeholder awareness raising campaign to create and increase momentum around the topic (recommendation 20). Secondly, we need to support teachers through trainings, and pedagogical exchanges and materials, capitalising on existing networks and proven best practices. While we acknowledge that these changes can take time to be implemented, it is important to already organise action days or weeks on the topic of food waste in schools, with the mobilisation of different societal actors (recommendation 21).

Rationale/justification

Food waste is the symptom of broader systemic issues which relate to how we produce, buy, and consume food today in Europe, hence why any pedagogical action needs to go beyond food waste, but consider values and desirable futures for production and consumption in Europe. Education remains a national competence and each Members State has different curricula. We acknowledge these differences, while encouraging the EU to promote ambitious actions, with new and/or existing schools subjects such as geography or economics.

Additional notes

RECOMMENDATION 19

Promote and support food sharing applications and platforms connecting consumers with each other

We recommend that the EU promotes and supports existing applications and platforms, such as Olio or FoodSharing.de. The tools to be promoted must meet some basic criteria and be assessed accordingly: user-friendliness, richness of the database, independence, adaptability to local contexts, and the real impact on curbing food waste. The EU, national and regional authorities need to be proactive in their promotion of most-promising existing tools and support, notably, but not only financially, their development and maintenance through their different research, action, and funding programmes. Public funding should encourage qualitative and neutral information, free of advertisements.

Rationale/justification

There are many applications that connect different actors, from businesses to consumers, or consumers to consumers. Some of these tools might have proven successful to connect consumers with each other, helping them to save food. However, they seem to have a limited geographical coverage or are not known enough by Europeans. We believe it is important for the EU and Member States to actively support technological innovations with high impact, leaving the door open to new ideas and innovations to emerge and to become sustainable in the long term.

Additional notes

RECOMMENDATION 20

Save food, save money: A European campaign against food waste in cooperation with food retailers on four weekends a year

We recommend that the EU coordinates a campaign focusing on shops selling food (food retailers, supermarkets, hypermarkets, smaller shops) to be deployed in the Member States. This campaign would take place over four weekends each year, and focus on the topic "save food, save money". It would be up to the different Member States to decide which weekends to pick. The choice of date should be based on the objective to raise awareness on food buying habits (for example around national or cultural celebrations) and seasonality (for example around harvest time). The campaign would be an initiative from the European Union, which would develop a uniform visual design (same logo, colour code, etc.) for all Member States. The campaign would then be implemented at the national level and adapted based on the specificities of each country, their annual calendar, food habits, etc.

Rationale/justification

We recommend this because it is important to raise awareness among citizens on food waste. There is only the International Day of Awareness on Food Loss and Waste Reduction, which is unknown among citizens and lost among the large amount of other international days. The new event would be extended to four weekends per year. This would develop the visibility of the issue among European citizens, and the form of repeated weekends through the year would be more useful than a single day. That would also be a way to differentiate the European event from standard international days.

Additional notes

- One benefit of our recommendation is that it would raise awareness among European citizens on food buying, consumption, and seasonality as ways to avoid food waste. Having a campaign organized around four weekends a year would bring regularity in the messages passed on to citizens. Another benefit would be encouraging cooperation with food retailers as part of this campaign and including food retailers in the fight against food waste.
- Among the challenges, there is the issue of how to get food retailers/food outlets involved in the event. Because the objectives of food retailers are to sell as much as possible, some may be reluctant to encourage people to consume less food or adopt different consumption habits. On the other hand, the objective of any shops, including those selling food, is to generate profits, so they might consider the event as a strategy to develop a good image as actors in the fight against food waste. Another challenge concerns the specific characteristics and annual calendar in national Member States in the EU: some countries don't celebrate Christmas, or celebrate it on different dates, and holidays can be different from one country to another.
- Other details on how the recommendation would be implemented:

  * Use diversified sources for the campaign against food waste in cooperation with food retailers: traditional media (television, newspapers), social media, use of local influencers, advertising. Take the opportunity of the four weekends to spread a strong Zero Food waste campaign.

  * On these weekends, the EU should communicate about the food retailers who already have organized and developed initiatives against food waste. The EU should support these already existing initiatives and communicate on good practices, sharing a positive narrative. We should not highlight shocking messages and focus on positive experiences.

  * Organize a follow-up and an evaluation of the 4 weekends to improve it and reach more and more people every year.

RECOMMENDATION 21

"Stop food waste": A week of food waste awareness at school

We recommend organizing a theme week in schools on food waste to raise awareness on the topic among young children and teenagers. The week would adopt a form and content depending on the age of the pupils. In primary schools and for younger children, the week should focus on raising awareness through games. The European Commission would create and distribute a toolkit for schools and teachers in all the EU languages on how to raise awareness on food waste at schools and how to discuss and organize activities on this topic in relation with their own teaching subjects. The toolkit would include guidelines with proposed activities to not overburden teachers and should be easily accessible online. Younger pupils would be rewarded by receiving a certificate (with the EU logo). National states would implement the week depending on the functioning of their respective education systems and of their academic calendars. Schools would be free to decide what activities they want to organize during the week, with the help of the toolkit made available for teachers.

Rationale/justification

Children should learn how to value food, how food is produced, and how much time it takes to produce food. It is important to gain this awareness early on. This kind of event can also reach parents through children and teenagers, because pupils tell their parents about their experiences at school when they come home.

Additional notes

- A benefit is that children should learn how to value food, how food is produced, and how many times it takes to produce food. It is important to start early with awareness learning. Another benefit is that this kind of event enable to reach parents through children and teenagers, because scholars tell their parents about their experiences at school when they come home.
- One of the challenges is to not overburden teachers to come up with all the activities and ideas on their own. For this reason, a framework or guidelines with proposed activities is very important to make it possible for all pupils in all schools to benefit from this initiative.

RECOMMENDATION 22

To provide consumers keys to be aware and independent on their impact on food waste and to understand how to process, preserve and reuse a product before and after the date has passed.

("use by" date is a safety date after which a product should not be consumed; "best before" indicates the date until which a product keeps its optimal quality)

We recommend the deployment of information tools to enlighten and (re)equip consumers in their ability to judge whether a product is truly expired. To make consumers aware of the use of their food products, we are in favour of better identification of the labelling of the best-before date: same place for each product and larger font size. Furthermore, we want to affix a QR code directly on the product label (the possibility of also using the barcode). What is the purpose of this? To transmit information on the best ways to preserve it, to recognize (by the taste and the smell) if it is still consumable, and to transmit culinary tips to transform the product (example of adapted recipes). The producers are, for us, the best placed to formalize the information available via the QR code. Concerning unlabelled products such as fruits and vegetables, the QR code should be put where the products are sold to avoid unnecessary packaging. For this source of information to be accessible to everyone, we are not betting essentially on digital technology. We also wish that paper communication tools (guides in supermarkets, for example) be made available.

Rationale/justification

We recommend this because, for us, this is a challenge to make consumers responsible in their food management. Completing the information available on a product is a way for consumers to understand the issues around the expiration date. It is also an opportunity to overcome the "misconceptions" or "fear of getting sick" after the expired date. Indeed, we know that producers are cautious with best-before date to protect themselves. In reality, the product can be consumed afterwards. We do not question the importance of indicating a use-by date. Indeed, it remains a key indicator of freshness.

Additional notes
A benefit is that we focus on labelling to inform consumers in the best way possible about the advantages for their wallet as well as for the environment. Our catchphrase summarizes our idea perfectly: “buy reasonably and eat cheaper”. To make known and promote this new source of information to consumers, we propose to deploy a large communication campaign to explain the objective of this new tool.

RECOMMENDATION 23

The implementation of standardized practices at the retail level when promoting to consumers products close to the expiration date.

We recommend that the purchase of products close to their expiration date be revalued by asking businesses to adopt a strategy for managing and valuing these products for the consumers. Indeed, it is a question of improving the perception by households of these products so that they are not intended for only one part of the population. This strategy is divided into several parts:

- a regulatory implementation part at the European level by creating a section dedicated to these products making them easily accessible and identifiable upon entering the store to promote better consumption practices by all users, regardless of income
- the development of a communication policy highlighting "common sense" and the attractiveness of the products as well as the responsible purchasing approach (promotional overconsumption aspects should not be on the front communication line)
- encouraging retailers to adapt their policy of putting new products close to their expiration date on the shelves at peak times (adapted to the practices of consumers in different European countries).

Rationale/justification

We recommend this because it reinforces an existing policy in many stores and standardizes "good practices" on a European scale. The group is paying particular attention to the beneficial effect of the generalization of these measures, which would change the image around low-priced products (not only available for households but to the whole population).

Additional notes

This recommendation is a way to promote companies' engagement in sustainable practices. Indeed, it can build consumers' loyalty. However, there are some challenges in putting this recommendation into practice:

- On the household side: to be more flexible and adapt the weekly menu with the products available
- On the side of professionals: to train the staff and introduce this new policy into practice
- On the side of the general population: to overcome the misconceptions and to change the perceptions of the recipients of these products, certainly at low cost, but which first fights against the unsold goods.

ANNEX 17: BIBLIOGRAPHY AND LIST OF FIGURES

Bibliography for textiles waste

Alcin-Enis I., Kucukali-Ozturk M., Sezgin H., "Risks and Management of Textile Waste". In: Gothandam K., Ranjan S., Dasgupta N., Lichtfouse E. (eds) *Nanoscience and Biotechnology for Environmental Applications. Environmental Chemistry for a Sustainable World*, vol 22. Springer, Cham., 2019, https://doi.org/10.1007/978-3-319-97922-9_2.

Atkar, A., Pabba, M., Sekhar, S.C., Sridhar, S., *Current limitations and challenges in the global textile sector,* Fundam Nat Fibres Text, 2021, pp. 741-764.

Bel J.-B. and ACR+ D4.5. *Guidelines for successful implementation. Guidelines for improving local waste collection systems*, 2020, https://www.collectors2020.eu/wp-content/uploads/2020/12/COLLECTORS_D4.5Guidelines-final.pdf.

Bel, J.-B., ACR+ & Flanagan, B., Eurocities *D4.6. Policy recommendations & development needs related to the waste framework conditions. Policy recommendations*, 2020, https://www.collectors2020.eu/wp-content/uploads/2020/12/COLLECTORS-D4.6_Policy-recommendations-final.pdf.

CESME, "3.1.5 HUMANITA textile recycling", *The CESME White Book*, https://www.cesme-book.eu/book/level-1-d/3.1-best-practices/3.1.2-humanita-textile-recycling.

Changing Markets Foundation, *Trashion: The stealth export of waste plastic clothes to Kenya,* 2023. (due for publication Feb 2023, http://changingmarkets.org/wp-content/uploads/2023/02/Trashion-Report-Web-Final.pdf.

COWI, Eunomia, *Study on investment needs in the waste sector and on the financing of municipal waste management in Member States*, 2019

Cura Kirsti Rintala, N., Kamppuri, T., Saarimäki, E., and Heikkilä, P., *"Textile Recognition and Sorting for Recycling at an Automated Line Using Near Infrared Spectroscopy"*, 2021.

ECAP, *Used textile collection in European cities,* 2018, http://www.ecap.eu.com/wp-content/uploads/2018/07/ECAP-Textile-collection-in-European-cities_full-report_with-summary.pdf.

ECAP, *ECAP and used textiles,* 2019, http://www.ecap.eu.com/wp-content/uploads/2019/07/Guidance-for-Textiles-Collections.pdf.

Elander, M., *Automated feeding equipment for textile waste: experiences from the FITS-project,* Mistra Future Fashion, 2019.

Ellen Mac Arthur Foundation, *A New Textiles Economy: Redesigning fashion's future*, 2017, https://ellenmacarthurfoundation.org/a-new-textiles-economy.

Ellen MacArthur Foundation and Boston Consulting Group, *Circular business models – Redefining growth for a thriving fashion industry*, 2021.

EMF, *A New Textiles Economy: Redesigning fashion's future*, 2017, https://ec.europa.eu/commission/presscorner/api/files/attachment/872168/Textiles%20Factsheet.pdf.pdf.

ETP, *Towards a 4th Industrial Revolution of Textiles and Clothing,* Brussels, 2016, 6.

EURATEX, *ReHubs: A joint initiative for industrial upcycling of textile waste streams & circular materials,* 2020. ReHubs - EURATEX.

European Commission, Climate Action, 2030 Climate Target Plan, https://climate.ec.europa.eu/eu-action/european-green-deal/2030-climate-target-plan_en.

European Commission, Directorate-General for Environment, Stahl, H., Merz, C., *Study to support the Commission in gathering structured information and defining of reporting obligations on waste oils and other hazardous waste: final report,* Publications Office, 2020, https://data.europa.eu/doi/10.2779/14834

European Commission, Directorate-General for Internal Market, Industry, Entrepreneurship and SMEs, Duhoux, T., Maes, E., Hirschnitz-Garbers, M., et al., *Study on the technical, regulatory, economic and environmental effectiveness of textile fibres recycling: final report* Publications Office, 2021, https://op.europa.eu/en/publication-detail/-/publication/739a1cca-6145-11ec-9c6c-01aa75ed71a1.

European Commission, Industry, European industrial strategy, Ecosystems, *Internal Market, Industry, Entrepreneurship and SMEs*, https://single-market-economy.ec.europa.eu/industry/strategy/ecosystems_en

European Commission, *Best Environmental Management Practice for the Waste Management Sector,* JRC Publications Repository, 2018, https://publications.jrc.ec.europa.eu/repository/handle/JRC111059.

European Commission, *Circular Economy Perspectives in the EU Textile sector,* JRC Publications Repository, 2021, https://publications.jrc.ec.europa.eu/repository/handle/JRC125110.

European Commission, *EU green public procurement criteria for textiles products and services,* SWD (2017) 231 final, 2017.

European Commission, Directorate-General for Environment, Dubois, M., Sims, E., Moerman, T., et al. *Guidance for separate collection of municipal waste*, Publications Office, 2020.

European Commission, Directorate-General for Environment, Weißenbacher, J., Dollhofer, M., Herczeg, M., et al., *Assessment of separate collection schemes in the 28 capitals of the EU: final report*.

European Commission, Directorate-General for Environment, Karigl, B., Neubauer, C., Kral, U., et al., *Scoping study to assess the feasibility of further EU measures on waste prevention: final report*, Publications Office of the European Union, 2022, https://data.europa.eu/doi/10.2779/21588

European Commission, Directorate-General for Research and Innovation, *A sustainable bioeconomy for Europe: strengthening the connection between economy, society and the environment: updated bioeconomy strategy,* Publications Office, 2018, A sustainable bioeconomy for Europe - Publications Office of the EU (europa.eu).

European Commission, Directorate-General for Internal Market, Industry, Entrepreneurship and SMEs, *Data on the EU textile ecosystem and its competitiveness: final report*, Publications Office of the European Union, 2021, https://data.europa.eu/doi/10.2873/23948.

European Commission, Joint Research Centre, Donatello, S., Danneck, J., Löw, C., et al. *Circular economy perspectives in the EU textile sector: final report*, Publications Office, 2021, https://data.europa.eu/doi/10.2760/858144.

European Commission, JRC Publications Repository, *Best Environmental Management Practice for the Waste Management Sector,* 2018, https://publications.jrc.ec.europa.eu/repository/handle/JRC111059.

European Environment Agency, *Progress towards preventing waste in Europe - the case of textile waste prevention,* EEA report No.15, 2021, https://www.eea.europa.eu/publications/progressing-towards-waste-prevention-in/at_download/file.

European Environment Agency, *Textiles and the Environment – The role of design in Europe's circular economy,* Textiles and the environment: the role of design in Europe's circular economy — European Environment Agency (europa.eu), 2022.

European Environment Agency, *Textiles in Europe's circular economy,* 2019, Textiles in Europe's circular economy — European Environment Agency.

European Environment Agency, *The use of primary raw materials in the upstream supply chain of EU-27 household consumption domains million tonnes* 2020 https://www.eea.europa.eu/data-and-maps/figures/the-use-of-primary-raw.

European Environment Agency, *Textiles and the environment in a circular economy*, 2019, https://www.eionet.europa.eu/etcs/etc-wmge/products/etc-wmge-reports/textiles-and-the-environment-in-a-circular-economy.

European Environment Agency, *Plastic in textiles: potentials for circularity and reduced environmental and climate impacts,* 2021, https://www.eea.europa.eu/themes/waste/resource-efficiency/plastic-in-textiles-towards-a.

European Environment Agency, *Waste prevention in Europe,* 2021, Waste prevention in Europe — European Environment Agency (europa.eu).

European Environmental Bureau, *Advancing resource efficiency in Europe*, 2014.

European Parliament, *Environmental impact of the textile and clothing industry: What consumers need to know,* 2019, https://www.europarl.europa.eu/thinktank/en/document/EPRS_BRI(2019)633143.

European Parliament, *The impact of textile production and waste on the environment,* 2020, https://www.europarl.europa.eu/news/en/headlines/society/20201208STO93327/the-impact-of-textile-production-and-waste-on-the-environment-infographic.

EUROSTAT, *Guidance for the compilation and reporting of data on municipal waste according to Commission Implementing Decisions 2019/1004/EC and 2019/1885/EC and the Joint Questionnaire of Eurostat and OECD, 2021*, https://ec.europa.eu/eurostat/documents/342366/351811/Guidance+on+municipal+waste+data+collection/.

EUROSTAT, *Guidance on classification of waste according to EWC-Stat categories,* 2010, https://ec.europa.eu/eurostat/documents/342366/351806/Guidance-on-EWCStat-categories-2010.pdf/0e7cd3fc-c05c-47a7-818f-1c2421e55604.

EUROSTAT, *E-commerce statistics for individuals,* 2022, E-commerce statistics for individuals - Statistics Explained (europa.eu).

EUROSTAT, *Prodcom - Statistics by products – Overview*, Overview - Prodcom - statistics by product - Eurostat (europa.eu).

Farrant, L., Olsen, S.I. & Wangel, A., *Environmental benefits from reusing clothes,* The International Journal of Life Cycle Assessment 15, 726–736 2010 https://doi.org/10.1007/s11367-010-0197-y.

Fashion for Good, *Sorting for Circularity Europe. An evaluation and commercial assessment of textile waste across Europe*, 2022.

Fortuna and Diyamandoglu, 2017 in Gustav Sandin and Greg M., Peters, *"*Environmental impact of textile reuse and recycling – A review"*, Journal of Cleaner Production,* Vol. 184, 2018, https://www.sciencedirect.com/science/article/pii/S0959652618305985#bib21.

Global Fashion Agenda & The Boston Consulting Group, *Pulse of the fashion industry*, 2017.

Greenpeace, *Poisoned Gifts. From donations to the dumpsite: textiles waste disguised as second-hand clothes exported to East Africa*, 2022, https://www.greenpeace.org/static/planet4-international-stateless/2022/04/9f50d3de-greenpeace-germany-poisoned-fast-fashion-briefing-factsheet-april-2022.pdf.

Greer, L., Keane, S., Lin, C., Zhou, A., Yiliqi Tong, T., Natural Resources Defense Council, *The Textile Industry Leaps Forward with Clean by Design: less environmental impact with bigger profits,* 2015.

H&M group, IKEA, Adidas, Bestseller, PVH, Gap Inc, Kingfisher, *Collaborative study on chemicals in recycled textiles,* 2021, https://www.naturvardsverket.se/contentassets/be04327b5a874955a5402d4f663d1632/webinar-collaborative-study-chemicals-recycled-textiles-hm-ikea.pdf.

Dumped in the Atacama desert the mountain of discarded cheap clothes from the West | Daily Mail Online.

Herjanto, H., & Scheller-Sampson, J., & Erickson, E., "the increasing phenomenon of second-hand clothes purchase: insights from the literature" *Jurnal Manajemen dan Kewirausahaan*, 18. 10.9744/jmk.18.1.1-15, 2019.

Hur, E. "Rebirth Fashion: Secondhand clothing consumption values and perceived risks" *Journal of Cleaner Production* Vol. 273 p.122951 2020 https://doi.org/10.1016/j.jclepro.2020.122951.

ISO, ISO 14040:2006, *Environmental management — Life cycle assessment — Principles and framework*, 2006, rev 2022

JRC, *Best Environmental Management Practice – Treatment of mattresses for improved recycling of materials*, 2016.

Köhler, A., Watson, D., Trzepacz, S., Löw, C., Liu, R., Danneck, J., Konstantas, A., Donatello, S., Faraca, G., *Circular Economy Perspectives in the EU Textile sector*, Publications Office of the European Union, 2021.

Les joyeux recycleurs, *Recyclage de vos tapis et moquettes mode d'emploi*, 2018, Recyclage de vos tapis et moquettes mode d'emploi - Les joyeux recycleurs.

Lai, O., *What is fast fashion*, Earth.org, 2021.

Maletic, M., *Shoe Recycling Guide: Recycle Your Footwear Responsibly* Green Citizen, 2022 Shoe Recycling Guide: Recycle Your Footwear Responsibly (greencitizen.com).

McKinsey, Global Fashion Agenda *Fashion on climate. How the fashion industry can urgently act to reduce its greenhouse gas emissions*, 2020.

McKinsey & Company, *Apparel, Fashion & Luxury Group Scaling textile recycling in Europe–turning waste into value* 2022.

McKinsey & Company, *Scaling textile recycling in Europe–turning waste into value*, 2022.

MDPI, *A Systematic Literature Review for the Recycling and Reuse of Wasted Clothing* 2021 https://www.mdpi.com/2071-1050/13/24/13732/pdf.

Migiro, G., *Top 10 Textile Importing Countries In The World*, WorldAtlas in Economics 2020. https://www.worldatlas.com/articles/top-10-textile-importing-countries-in-the-world.html.

NRDC, *Encourage Textile Manufacturers to Reduce Pollution* 2022.

OECD, *Germany supports sustainable textile production,* Development co-operation tips tools insights practices in practice 2022, Germany supports sustainable textile production - OECD.

OECD, *Understanding the Spillovers and Transboundary Impacts of Public Policies, Implementing the 2030 Agenda for More Resilient Societies,* 2021, https://www.oecd.org/gov/pcsd/understanding-the-spillovers-and-transboundary-impacts-of-public-policies-862c0db7-en.htm.

Recycling Magazine, *World's first fully automated textile sorting plant in Malmö*, 2021, World's first fully automated textile sorting plant in Malmö - RECYCLING magazine (recycling-magazine.com).

Refashion press release, *Lauch of RECYCLE by Refashion,* 2021, https://refashion.fr/pro/en/press-releases ; https://www.textile.fr/actualite/recycle-plateforme-digitale-de-mise-en-relation-des-acteurs-du-recyclage-de-refashion.

RREUSE, *Job creation in the reuse sector: data insights from social enterprises,* 2021.

RREUSE, *Vision for a new fashion season: social and circular stakeholder workshop* The Policy hub – response to interview questionnaire.

RREUSE, *Research study on developing reuse networks in Europe,* 2022

Sandin, G., and M. Peters, G., *Environmental impact of textile reuse and recycling – A review*, 2018, https://www.sciencedirect.com/science/article/pii/S0959652618305985#bib21.

Scheffer, M.R. 'Shishoo R. (ed.). The global textile and clothing industry Technological advances and future challenges *Trends in textile markets and their implications for textile products and processes* Cambridge: Woodhead Publishing Ltd 2012 pp. 8– 28.

Shaikh, M.A., *Water conservation in textile industry,* College of Textile Engineering, SFDAC, 2009.

Statista, *Fashion e-commerce revenue forecast in Europe from 2017 to 2025, by segment,* 2022 Europe: e-commerce fashion segment revenue | Statista.

STATISTA, *Household consumption of textiles and clothing in the European Union from 2009 to 2020,* 2022.

Textile & clothing EU household consumption 2009-2020 | Statista.

Swedish Environmental Protection Agency, *Response to interview questionnaire*, 2022.

The Conversation, *Do you shop for second-hand clothes? You're likely to be more stylish,* 2022. Do you shop for second-hand clothes? You're likely to be more stylish (theconversation.com).

The Exchange, *Africa is fighting a losing battle banning used apparel*, 2021, https://theexchange.africa/industry-and-trade/africa-second-hand-clothes-imports-ban/.

The Policy Hub, *Circularity for Apparel and Footwear*, Response to interview questionnaire, 2022.

Tojo, N., Kogg, B., Kiørboe, N., Kjær B. and Aalto K., *Prevention of Textile Waste. Material flows of textiles in three Nordic countries and suggestions on policy instruments*, NORDEN, http://dx.doi.org/10.6027/TN2012-545

United Nations, Kuwonu, F., Protectionist ban on imported used clothing | Africa Renewal (un.org), December 2017 - March 2018

Watson, D., Kant Hvass, K., Moora, H., Martin, K., Nausėdė, V., Gurauskiene, I., & Akule, D., *Textile circularity in the Baltic countries: current status and recommendations for the future* Nordic Council of Ministers TemaNord Report 2020b.

Watson, D., Trzepacz, S., Kiørboe, N., Elander, M., Ljungkvist Nordin, H., Lander Svendsen N., & Wittus Skottfelt, S., *Towards 2025: Separate Collection and Treatment of Used Textiles in 6 EU countries* 2020a.

Watson, D., Aare, A., K., Trzepacz, S., and Dahl Petersen, C., *Used Textile Collection in European Cities,* Study commissioned by Rijkswaterstaat under the European Clothing Action Plan (ECAP) 2018a.

Bibliography for food waste

Aguiar, A., Chepeliev, M., Corong, E., Mcdougal, R., Van der Mensbrugghe, D., The gtap data base: Version 10. J. Glob. Econ. Anal. 4 1–27, 2019a, https://doi.org/10.21642/JGEA.040101AF

Aguiar A Corong E.L an der Mensbrugghe D Bekkers E Koopman R Teh R 2019b. The WTO Global Trade Model: Technical documentation WTO Staff Working Papers.

Amadei, A.M., Laurentiis, V. De, Sala, S., 2021. A review of monetary valuation in life cycle assessment : State of the art and future needs. J. Clean. Prod. 329, 129668. https://doi.org/10.1016/j.jclepro.2021.129668

Andreasi Bassi, S., Biganzoli, F., Ferrara, N., Amadei, A., Valente, A., Sala, S. and Ardente, F.

(2023) Updated characterisation and normalisation factors for the Environmental Footprint 3.1 method, EUR 31414 EN, Publications Office of the European Union, Luxembourg, ISBN 978-92-76-99069-7, doi:10.2760/798894, JRC130796.

Barba Navaretti G Castellani D Pieri F 2014. Age and firm growth: evidence from three European countries. Small Bus. Econ. 43 823–837. https://doi.org/10.1007/s11187-014-9564-6

Bartelings H Verma M Boysen K 2021. Waste management and circular economy in a CGE framework Heleen Bartelings. 24th Annual Conference on Global Economic Analysis p. 14.

Beck, T., Demirgüç-Kunt, A., Maksimovic, V., 2005. Financial and Legal Constraints to Growth: Does Firm Size Matter? J. Finance 60, 137–177. https://doi.org/10.1111/j.1540-6261.2005.00727.x

Boulanger P Boysen-Urban K Philippidis G 2021. European union agricultural support 'coupling' in simulation modelling: Measuring the sustainability impacts. Sustainability 13 1–17. https://doi.org/10.3390/su13063264

Boulanger P Philippidis G 2015. The EU budget battle: Assessing the trade and welfare impacts of CAP budgetary reform. Food Policy 51 119–130. https://doi.org/10.1016/j.foodpol.2015.01.004

Boysen-Urban K M'barek R Philippidis G ferrer Perez H 2022. Exploring changing food attitudes to respect planetary boundaries - A global model-based analysis. https://doi.org/10.2760/744504

Caldeira C De Laurentiis V Ghose A Corrado S Sala S 2021. Grown and thrown: Exploring approaches to estimate food waste in EU countries. Resour. Conserv. Recycl. 168 105426. https://doi.org/10.1016/j.resconrec.2021.105426

Castellani V Fusi A Sala S 2017. Consumer Footprint Basket of Products indicator on Food. https://doi.org/10.2760/668763

Champions 12.3 2017. The Business Case for Reducing Food Loss and Waste.

Christopherson S 2015. How does financialization affect manufacturing investment? Preliminary evidence from the US and UK in: J. R. Bryson J. Clark V. Vanchan (Eds Handbook of Manufacturing Industries in the World Economy. Edward Elgar Cheltenham pp. 42–57.

Corong E 2017. The Standard GTAP Model: Version 7. J. Glob. Econ. Anal. 2 1–118. https://doi.org/10.21642/jgea.0201xxad

Crenna E Sinkko T Sala S 2019. Biodiversity impacts due to food consumption in Europe. J. Clean. Prod. 227 378–391. https://doi.org/10.1016/J.JCLEPRO.2019.04.054

Crippa M Solazzo E Guizzardi D Monforti-Ferrario F Tubiello F.N Leip A 2021. Food systems are responsible for a third of global anthropogenic GHG emissions. Nat. Food 2 198–209.

https://doi.org/10.1038/s43016-021-00225-9

Daioglou V Stehfest E Wicke B Faaij A van Vuuren D.P 2016. Projections of the availability and cost of residues from agriculture and forestry. GCB Bioenergy 8 456–470. https://doi.org/10.1111/gcbb.12285

De Jong B Boysen-Urban K De Laurentiis V Philippidis G Bartelings H Mancini L Biganzoli F Sanyé Mengual E Sala S Lasarte-López J Rokicki B M'barek R. *Assessing the economic, social and environmental impacts of food waste reduction targets. A model-based analysis.* Publications Office of the European Union, Luxembourg, 2023, doi:10.2760/77251, JRC133971.

De Laurentiis, V, Mancini, L, Casonato, C, Boysen-Urban, K, De Jong, B, M'Barek, R, Sanyé Mengual, E, Sala, S. *Setting the scene for an EU initiative on food waste reduction targets*. Publication Office of the European Union, Luxembourg, 2023, doi: 10.2760/13859, JRC133967De Laurentiis V Caldeira C Biganzoli F Serenella S European Commission. Joint Research Centre 2021. Building a balancing system for food waste accounting at national level. Luxembourg. https://doi.org/10.2760/316306

De Laurentiis V Caldeira C Sala S 2020. No time to waste: assessing the performance of food waste prevention actions. Resour. Conserv. Recycl. 161 104946. https://doi.org/https://doi.org/10.1016/j.resconrec.2020.104946

Demirel P Danisman G.O 2019. Eco- innovation and firm growth in the circular economy: Evidence from European small- and medium- sized enterprises. Bus. Strateg. Environ. 28 1608–1618. https://doi.org/10.1002/bse.2336

EC - Joint Research Centre, 2022. European Platform on Life Cycle Assessment. Consumption Footprint Platform [WWW Document]. URL https://eplca.jrc.ec.europa.eu/ConsumptionFootprintPlatform.html

EC - European Commission 2021. Commission recommendation of 16.12.2021 on the use of the Environmental Footprint methods to measure and communicate the life cycle environmental performance of products and organisations. (2021) 9332 final.

EC - European Commission 2020. A Farm to Fork Strategy for a fair healthy and environmentally-friendly food system. COM/2020/381 final.

EEA 2022. Annual European Union greenhouse gas inventory 1990–2020 and inventory report 2022 Submission to the UNFCCC Secretariat.

ESTAT 2022. Food waste and food waste prevention by NACE Rev. 2 activity - tonnes of fresh mass Eur. Comm.

European Commission, Directorate-General for Research and Innovation, Borzęcka, M., Oberč, B., Haffner, R., et al, 2018a. Research and innovation perspective of the mid-and long-term potential for advanced biofuels in Europe : final report. Publications Office. https://doi.org/https://data.europa.eu/doi/10.2777/557801

European Commission, Directorate-General for Research and Innovation, Witzke, P., Zazias, G., Dzene, I. e. al, 2018b. Research and innovation perspective of the mid-and long-term potential for advanced biofuels in Europe – D1.2 Research and innovation scenarios for biomass potential. Publications Office. https://doi.org/https://data.europa.eu/doi/10.2777/557801

Ferrari E Chatzopoulos T Perez-Dominguez I Boulanger P Boysen-Urban K Himics M Robert M 2021. Cumulative economic impact of trade agreements on EU agriculture – 2021 update. Luxembourg. https://doi.org/10.2760/501873

García Herrero, L., Casonato, C., Caldeira, C., De Laurentiis, V., Bruns, H., Nohlen, H., Sala, S., 2023. Scoping consumer food waste: an evaluation framework of prevention interventions. JRC Interim report.

FAO 2013. Food wastage footprint Fao.

Ipinnaiye O Dineen D Lenihan H 2017. Drivers of SME performance: a holistic and multivariate approach. Small Bus. Econ. 48 883–911. https://doi.org/10.1007/s11187-016-9819-5

Kaza S Yao L.C Bhada-Tata P Van Woerden F 2018. What a Waste 2.0 : A Global Snapshot of Solid Waste Management to 2050 Urban Development. Washington DC.

Keramidas K Fosse F Diaz-Vazquez A Schade B Tchung-Ming S Weitzel M Vandyck T Wojtowicz K 2021. Global Energy and Climate Outlook 2020: A New Normal Beyond Covid-19 Luxembourg: Publications Office of the European Union. https://doi.org/10.2760/608429

Kuiper M Cui H.D 2021. Using food loss reduction to reach food security and environmental objectives – A search for promising leverage points. Food Policy 98 101915. https://doi.org/10.1016/j.foodpol.2020.101915

Lai Y Saridakis G Blackburn R Johnstone S 2016. Are the HR responses of small firms different from large firms in times of recession? J. Bus. Ventur. 31 113–131. https://doi.org/10.1016/j.jbusvent.2015.04.005

Lasarte-López. J Ronzon T Van Leeuwen M Rossi W M'barek R 2022. Estimating employment and value added in the bioeconomy of EU regions. https://doi.org/http://dx.doi.org/10.2760/850726

M'barek R 2012. An integrated modelling platform for agro-economic commodity and policy analysis (iMAP) : a look back and the way forward. https://doi.org/10.2791/78367

M'barek, R., Barreiro-Hurle, J., Boulanger, P., Caivano, A., P. Ciaian, Dudu, H., Espinosa, N., Fellmann, T., Ferrari, E., Gomez y Paloma, S., Gorrin Gonzalez, C., Himics, M., Louchini, K., Pemi, G., Philippidis, G., Salputra, G., Witzke, P., Genovese, G., 2017. Scenar 2030 - Pathways for the European agriculture and food sector beyond 2020 (re-edition). Luxembourg. https://doi.org/10.2760/43791

M'barek R Delincé J 2015. iMAP an integrated Modelling Platform for Agro-economic Commodity and Policy Analysis: New developments and policy support 2012-14. Joint Research Centre Institute for Prospective Technological Studies. https://doi.org/10.2791/651649

MAGNET, 2023. MAGNET model description, https://www.magnet-model.eu/model/ (accessed 15.04.2023).

Mateev M Anastasov Y 2011. On the Growth of Micro Small and Medium-Sized Firms in Central and Eastern Europe: A Dynamic Panel Analysis. Bank. Financ. Rev. 3 81–104.

Mazzucato M Parris S 2015. High-growth firms in changing competitive environments: the US pharmaceutical industry (1963 to 2002). Small Bus. Econ. 44 145–170. https://doi.org/10.1007/s11187-014-9583-3

Naturvårdsverket 2022. Livsmedelsavfall i Sverige 2020.

Notarnicola B Tassielli G Renzulli P.A Castellani V Sala S 2017. Environmental impacts of food consumption in Europe. J. Clean. Prod. 140 753–765. https://doi.org/10.1016/j.jclepro.2016.06.080

OECD-FAO 2021. OECD-FAO agricultural outlook 2021-2030.

OECD 2021. OECD SME and Entrepreneurship Outlook 2021. OECD. https://doi.org/10.1787/97a5bbfe-en

Philippidis, G., M'barek, R., Urban-Boysen, K., Van Zeist, WJ., 2023. Exploring economy-wide sustainable conditions for EU bio-chemical activities, Ecological Economics, Volume 210, 107857, https://doi.org/10.1016/j.ecolecon.2023.107857

Philippidis, G., Di Lucia, L., Sevigne, E., Panoutsou, C., Verkerk, H., Moiseyev, A., Van Leeuwen, M., Sturm, V., M'barek, R., Martinez Gonzalez, A., Alvarez, R., Hermoso Gonzalez, H., 2022. Scenario analysis and related policy recommendations, Deliverable 6.2, Work Package 6, BioMonitor: Monitoring the BioEconomy.

Philippidis G Bartelings H Helming J M'barek R Ronzon T Smeets E van Meijl H Schutes L 2018. The MAGNET model framework for assessing policy coherence and SDGs - Application to the bioeconomy. Publications Office of the European Union Luxembourg. https://doi.org/10.2760/560977

Philippidis G Ferrer Pérez H Gracia de Rentería P M'barek R Sanjuán López A.I 2021. Eating your greens: a global sustainability assessment. Resour. Conserv. Recycl. 168. https://doi.org/10.1016/j.resconrec.2021.105460

Philippidis G Sartori M Ferrari E M'Barek R 2019. Waste not want not: A bio-economic impact assessment of household food waste reductions in the EU. Resour. Conserv. Recycl. 146 514–522. https://doi.org/10.1016/j.resconrec.2019.04.016

Philippidis G Shutes L M'barek R Ronzon T Tabeau A van Meijl H 2020. Snakes and ladders: World development pathways' synergies and trade-offs through the lens of the Sustainable Development Goals. J. Clean. Prod. 267. https://doi.org/10.1016/j.jclepro.2020.122147

Polizzi di Sorrentino E Woelbert E Sala S 2016. Consumers and their behavior: state of the art in behavioral science supporting use phase modeling in LCA and ecodesign. Int. J. Life Cycle Assess. 21 237–251. https://doi.org/10.1007/s11367-015-1016-2

Rigtering J.P.C Kraus S Eggers F Jensen S.H 2014. A comparative analysis of the entrepreneurial orientation/growth relationship in service firms and manufacturing firms. Serv. Ind. J. 34 275–294. https://doi.org/10.1080/02642069.2013.778978

Sala S Castellani V 2019. The consumer footprint: Monitoring sustainable development goal 12 with process-based life cycle assessment. J. Clean. Prod. 240 118050.

Sala S Crenna E Secchi M Sanyé-Mengual E 2020. Environmental sustainability of European production and consumption assessed against planetary boundaries. J. Environ. Manage. 269 110686. https://doi.org/10.1016/j.jenvman.2020.110686

Sala S Sanye Mengual E 2022. Consumption Footprint: assessing the environmental impacts of EU consumption, European Commission, JRC126257.

Sanye Mengual, E., and Sala, S., Consumption Footprint and Domestic Footprint: Assessing the environmental impacts of EU consumption and production, EUR 31390 EN, Publications Office of the European Union, Luxembourg, 2023, ISBN 978-92-76-61754-9, doi:10.2760/218540, JRC128571.

Sanyé-Mengual, E., Secchi, M., Corrado, S., Beylot, A., & Sala, S. (2019). Assessing the decoupling of economic growth from environmental impacts in the European Union: A consumption-based approach. Journal of cleaner production, 236, 117535.

Sanyé Mengual E, Foschi J, Orza V, Sinkko T, Wierzgala P, Sala S. (2023a) Consumption Footprint: methodological overview, A life cycle assessment-based model to assess environmental impacts of consumption, Publications Office of the European Union, Luxembourg, doi:10.2760/413081, JRC132734

Sanyé-Mengual, E., Biganzoli, F., Valente, A., Pfister, S., & Sala, S. (2023b). What are the main environmental impacts and products contributing to the biodiversity footprint of EU consumption? A comparison of life cycle impact assessment methods and models. The International Journal of Life Cycle Assessment, 1-17.

Sartori M Philippidis G Ferrari E Borrelli P Lugato E Montanarella L Panagos P 2019. A linkage between the biophysical and the economic: Assessing the global market impacts of soil erosion. Land use policy 86 299–312. https://doi.org/10.1016/j.landusepol.2019.05.014

Sasaki, Y., Orikasa, T., Nakamura, N., Hayashi, K., Yasaka, Y., Makino, N., Shobatake, K., Koide, S., Shiina, T., 2021. Dataset for life cycle assessment of strawberry-package supply chain with considering food loss during transportation. Data Br. 39, 107473. https://doi.org/10.1016/j.dib.2021.107473

The Netherlands Nutrition Centre Foundation 2019. Synthesis report on Food Waste in Dutch Households in 2019.

UN General Assembly 2015. Transforming our world: the 2030 Agenda for Sustainable Development. New York United Nations.

Verma MvdB, M., de Vreede, L., Achterbosch, T., Rutten, M.M., 2020. Consumers discard a lot more food than widely believed: Estimates of global food waste using an energy gap approach and affluence elasticity of food waste. PLoS One 15, 1–14. https://doi.org/10.1371/journal.pone.0228369

White, A., Lockyer, S., 2020. Removing plastic packaging from fresh produce – what's the impact? Nutr. Bull. 45, 35–50. https://doi.org/10.1111/nbu.12420

Woltjer G Kuiper M 2014. The MAGNET model: Module description. Wageningen UR. 144.

WRAP, 2020, Banbury, UK progress against Courtauld 2025 targets and Sustainable Development Goal 12.3, Prepared by Andrew Parry, Billy Harris, Karen Fisher and Hamish Forbes

WRAP 2022. The Food Waste Reduction Roadmap Progress Report 2022.

WUR 2022. Minder voedselverspilling in supermarkten.

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