Progress towards preventing waste in Europe — the case of textile waste prevention

European Environment Agency

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Contents

Acknowledgements

Key messages

- The EU as a whole and many individual countries have achieved a relative decoupling of waste generation from economic growth. However, there are no signs that the overall objective of reducing waste generation in a growing economy is close to being achieved.

- Data for trends in waste generation show no observable link between the adoption of waste prevention programmes by countries in 2013 and the amount of waste generated. In fact, waste generation, excluding major mineral wastes, increased by 5.2 % between 2014 and 2018 in the EU.

- In mid-2021, 10 out of the 32 countries examined did not have a waste prevention programme in place, although all EU Member States had one in place earlier. This might be the result of countries deciding to align waste prevention policies with waste management plans or circular economy strategies, which can unlock synergetic effects.

- The introduction of solid quantitative prevention targets at the EU level would help consolidate prevention efforts in European countries and promote a comprehensive prevention policy, including measures and indicators, driven by the objective of fulfilling the target.

- Textile waste would benefit greatly from waste prevention measures, as this is a fast-growing, environmentally impactful waste stream associated with unsustainable consumption patterns. The average European generates approximately 11 kg of textile waste annually.

- Preventing textile waste has great potential, mainly through reducing consumption, eco-design and ultimately reuse. To facilitate this, emphasis should be put on product design to promote durable and long-lasting materials, while support should be given to repair (e.g. tax breaks) and reuse (e.g. regulation).

Executive summary

Waste prevention is the best waste management policy option, according to the waste hierarchy, the EU's main rule for the environmental ranking of waste management policies. Its main objective is to reduce waste generation, the environmental impacts of waste management and the hazardousness of the waste generated. It is mainly expressed as the aspiration to break the link between waste generation and economic growth (decoupling). To support this objective, the EU and all is Member States have put in place legislation that promotes activities in products' life cycles aimed at reducing the amount of waste generated. At the national level, these policies are described in national or regional waste prevention programmes, which have been in place in most of the countries examined since at least 2013.

This report aims to assess progress towards waste prevention measures' main objective of decoupling, scoping the EU as a whole by synthesising information from national waste prevention measures, targets, indicators and targeted waste streams. Our analysis shows that waste generation at the EU level is still very dependent on developments in the economy, as expressed through gross domestic product (GDP). The EU has achieved a relative decoupling, meaning that waste generation is growing, albeit at a slower pace than the economy. However, there are no signs that absolute decoupling, meaning that waste is decreasing in a growing economy, is close to being achieved at the EU level. Moreover, there is no observable effect of the wide adoption by countries of waste prevention programmes since at least 2013, as waste generation, excluding major mineral wastes, has increased by 5.7 % in the 4 years between 2014 and 2018. At the national level, changes in population have not been large enough to sufficiently explain the changes in waste intensity, defined as the amount of waste generated per unit of GDP. Overall, only 7 out of 30 countries showed an increase in waste intensity (more waste generated per unit GDP) between 2008 and 2018, while 12 countries showed a strong (more than 10 percentage points) decrease.

The national/regional waste prevention programmes have been analysed with respect to the waste streams in focus, indicators, targets and waste prevention measures. This examination revealed that 10 out of the 32 countries reviewed do not have a waste prevention programme in place (based on data from 2021). To date, only 10 countries have updated their waste prevention programmes according to the revised Waste Framework Directive ((EU) 2018/851). Updated programmes show a higher tendency to set quantitative targets when there were solely qualitative targets before, indicating a stronger movement towards waste prevention. While informative measures and awareness-raising are the most used measure types in Member States, we found that the number of newly initiated voluntary agreements has decreased slightly. Finally, with regard to specific waste streams, measures addressing plastic packaging waste, food waste and waste electronic products in particular have gained in importance.

With regard to the new focus area of food waste, it has been shown that most countries are already active in promoting food waste prevention. The measures implemented, however, have been evaluated as relatively light and tend to focus on voluntary commitments or information provision. With the food waste prevention programmes currently developed across Europe, it is expected that food waste prevention policy will be designed in a more systematic manner and that more effective measures, targets and data collection systems for food waste will be introduced. Prevention of waste through reuse, which is the second new focus area, has gained importance for a number of product groups. Analysis has, however, revealed divergent frameworks depending on product group, with reuse already established and a central part of the market for certain product groups (e.g. for cars) and still in its infancy for others. However, the recent focus of EU legislation on reuse is expected to motivate EU Member States to intensify their efforts, especially with respect to product groups addressed by that legislation, namely electronics, furniture, construction materials and products, and textiles.

The second part of this report examines the potential of waste prevention policies to address the growing quantities of textile wastes. Textile is a very suitable candidate for such policies, as it is a fast-growing waste stream, based on unsustainable consumption patterns, driven by phenomena such as fast fashion. This suitability is increasingly being recognised by EU policymakers, as the textile industry is a key sector for applying circular economy measures, a key part of which is waste prevention.

Each European citizen generates around 11 kg of textile waste annually. Of this quantity, around one third is separately collected for reuse and recycling, suggesting that two thirds ends up in residual waste or is stored in households. Several drivers have been identified for the generation of textile waste, including the increasing number of clothing collections placed

on the market by fashion brands, social media advertising fast fashion brands and digitalisation, which has helped fashion brands to develop efficient supply chains and gain customers through online shopping.

The assessment of the policy background on textile waste prevention has highlighted various regulations that are directly or indirectly linked to textile waste generation, such as the Textile Regulation on textile fibre names and related labelling and marking of the fibre composition of textile products ((EU) No 1007/2011), the REACH (Registration, Evaluation, Authorisation and Restriction of Chemicals) Regulation ((EC) No 1907/2006) and the EU green public procurement criteria for textile products and services. At the national level, various measures have been set out by Member States to address textile waste. While 40 measures have been recorded in total across all programmes, some included specific sub-chapters dealing with textile waste generation and linked environmental impacts. Currently, only 6 out of 31 national and regional waste prevention programmes include specific indicators on textile waste prevention. The majority of these indicators focus on the reuse of clothing and footwear. When it comes to targets, it has been shown that none of the currently available waste prevention programmes include quantified targets for textile waste prevention. This could be a major drawback in waste prevention efforts, as solid targets are a driver for comprehensive policies.

Furthermore, we assessed the intervention points for textile waste prevention throughout products' life cycle stages; this highlights the potential at each stage such as product design, production and distribution, use and maintenance, and reuse to contribute to waste prevention. Various potential measures are discussed, such as the extended producer responsibility schemes, which can encourage collection for reuse and improve durability. A key barrier to the implementation of textile waste prevention measures, targets and indicators continues to be that the actual quantity of textile waste generation remains widely unknown. It is argued that increasing the collection rate will make more textiles available for recycling and potentially also for reuse. Although the textile value chain is highly globalised and complex, closing communication gaps between stakeholders, implementing 'design for prevention' and increasing transparency, i.e. traceability, would accelerate textile waste prevention efforts. More specifically, strategies need to be developed to address the increasing consumption of textiles, advance their durability through improved design, and support repair and reuse through economic instruments and regulation.

1
Introduction

Waste prevention is a key strategy for Europe's transformation towards a resource-light and climate-neutral circular economy. The long-established waste prevention hierarchy, as the optimal policy option for dealing with waste generation (Figure 1.1), offers the same type of systemic and transformational policy objective as the aspiration for a circular economy. Waste prevention, by definition, links different life cycle stages of products together under a common principle, namely that of waste reduction. In this way, waste prevention provides a comprehensive policy approach that links together stakeholders in the supply chain, design and use of products and services, and waste management.

When we look closer at the circular economy objectives of reducing the extraction of natural resources and keeping the value of products as high as possible and for as long as possible, it is evident that waste prevention clearly contributes to this directly. Adopting key waste prevention strategies, such as design for durability and longevity, reuse of products and materials and the extension of product lifespans, ultimately leads to using fewer products, and therefore resources, to satisfy our societal needs. Other waste prevention options, such as repair and remanufacturing, can safeguard the value of products and make sure that they are used until the actual end of their service life. Waste prevention strategies are conceptually summarised in Figure 1.2.
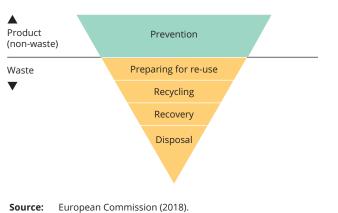
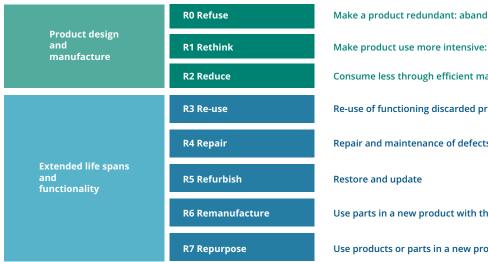**Figure 1.1**   **The EU waste hierarchy**

Product (non-waste) ▲

Prevention

Waste ▼

Preparing for re-use

Recycling

Recovery

Disposal

Source: European Commission (2018).

Figure 1.2   The R strategies for waste prevention and management

Product design and manufacture	R0 Refuse	Make a product redundant: abandon function or use different product
	R1 Rethink	Make product use more intensive: sharing or multi-functional products
	R2 Reduce	Consume less through efficient manufacturing or use
Extended life spans and functionality	R3 Re-use	Re-use of functioning discarded products by another use
	R4 Repair	Repair and maintenance of defects to deep original function
	R5 Refurbish	Restore and update
	R6 Remanufacture	Use parts in a new product with the same function
	R7 Repurpose	Use products or parts in a new product with a different function

The importance of waste prevention, as outlined above, is recognised not only in EU legislation, but also in the 2020 circular economy action plan, which calls for specific waste prevention steps to be taken and for the consideration of developing waste prevention targets for specific sectors and waste streams.

According to the definition set out in the revised Waste Framework Directive (WFD), waste prevention refers to:

measures taken before a substance, material or product has become waste, that reduce:

a. the quantity of waste, including through the reuse of products or the extension of the lifespan of products;

b. the adverse impacts of the generated waste on the environment and human health; or

c. the content of hazardous substances in materials and products. (EU, 2018).

The overall objective for implementing waste prevention is to 'break the link between economic growth and the environmental impacts associated with the generation of waste' (EU, 2018). In order to implement waste prevention, in accordance with Article 29 of the WFD, Member States have to establish waste prevention programmes describing specific objectives and measures.

Waste prevention can be applied to separate waste streams (see Box 1.1) and the overall policies can be supported by tailor-made measures that address particular aspects of the waste stream in question. Textile waste is a prime candidate stream that would benefit greatly from implementing waste prevention on

account of the high levels of consumption of textile products in Europe and its increasing waste generation. More broadly, textiles is also a very relevant sector for EU policymaking. It has been recognised as a key sector in the circular economy action plan of 2020. Currently, the European Commission is working on preparing a textile strategy for the EU. Therefore, the thematic part of this report focuses on the prevention of textile waste, assessing the potential for prevention in this waste stream and gathering knowledge that will be potentially useful for the broad policy processes currently in the making.

This report has a dual purpose. The first is to provide a snapshot of the current implementation of waste prevention measures in Europe and assess the progress towards the main overall objective of waste prevention of decoupling waste generation from economic growth. The second aim of the report is to investigate a specific waste stream and assess its prospects for implementing waste prevention. Therefore, this report is divided into two parts:

• Chapter 2 provides an overview of the progress towards implementing waste prevention as a whole. It describes the current policy framework and the status quo of national and regional waste prevention programmes, analyses the planned and implemented waste prevention measures in these programmes and reviews progress towards waste prevention based on waste intensities. A specific emphasis has been put on the development of new waste prevention-monitoring approaches for reuse and food waste, in line with policy developments at the EU level.

• Chapter 3 is thematic and focuses on the assessment of the implementation of waste prevention for textile wastes and involves in-depth analyses of the potential for, barriers to and progress by each Member State and at the EU level.

Box 1.1   Prevention of emerging waste streams

The energy transition to a clean energy system involves several technologies, essential for bringing about this transition effectively: wind power plants, photovoltaics and energy storage systems. It is expected that waste from the end-of-life stage of such technologies will increase exponentially in the coming years.

Waste prevention can tackle these emerging waste streams by interventions in product design and maintenance (for more details, please consult the EEA briefing on emerging waste streams ([a])) and some European countries are already moving in that direction:

- In 2020, Enel Green, in Spain, launched a call for start-ups to develop solutions for the life extension, recyclability and remanufacturing of wind turbine components.

- In the wind sector, some producers offer regular maintenance and repair of wind turbines in operation to increase the durability and life span of wind power plants, and others are exploring targets for waste prevention using life cycle assessment.

- In Finland, France, Germany and some other European countries, enterprises have come to agreements with electric car manufacturers to use batteries that have been decommissioned but still function in a second-life application as residential battery packs for storing solar energy.

Note: ([a]) https://www.eea.europa.eu/publications/emerging-waste-streams-opportunities-and

2 Monitoring progress in waste prevention implementation

2.1 Decoupling waste generation from economic growth

Article 30 of the revised Waste Framework Directive (WFD) mandates the EEA to analyse the 'decoupling of waste generation from economic growth and the transition towards a circular economy' (EU, 2018). In the past, increases in economic output have been accompanied by simultaneous increases in waste generation, and so sustained economic growth brings a continual increase in waste generation. The transition towards a circular economy in Europe, in which the value of products and raw materials contained in those are preserved for as long as possible, aims to break this link and minimise overall waste generation. Successful waste prevention aims to increase well-being and reduce waste generation and the corresponding environmental impacts.

There are three types of decoupling:

1. absolute decoupling, when waste generation is decreasing, while the economy is growing;

2. relative decoupling, when waste generation is increasing, but at a slower pace than economic growth;

3. no decoupling, when waste generation is increasing at the same pace as or faster than the economy.

Interpreting these types of decoupling and linking them to waste prevention measures is difficult, as other socio-economic factors also influence the level of waste generated. First of all, regarding the influence of economic factors, waste generation depends more on specific expenditure types and the share of expenditure types by income than on broad, economy-wide economic developments, in particular when examining specific waste streams. Other social factors that affect waste generation are demography (especially population growth) and household size. Underlying this is the cultural variety of Europe, which encompasses a range of lifestyle habits across all areas, including consumption and waste management.

This complexity of factors affecting waste generation is significant when trying to interpret trends. When it is impossible to establish causal links between waste prevention measures and waste generation trends, it is difficult to draw conclusions on decoupling, as the decoupling stability might be compromised by other socio-economic factors. For example, during the dip in waste generation during the financial crisis of 2008-2010 did not lead to decoupling because it was a result of an economic downturn, not the effect of waste policy making.

2.1.1 EU level

Figure 2.1 shows that waste generation in the EU has been increasing constantly since 2008. Between 2008 and 2018, total waste generation increased by 8.5 % (more than 182 million tonnes). Major mineral wastes, such as hard rocks, concrete and soils, comprise a major share of total waste. However, this type of waste is produced in specific economic sectors (construction and mining) and the management of this type of waste poses a relatively low environmental concern compared with other waste types. Therefore, to be able to interpret trends in a more meaningful way, Figure 2.1 includes a trend for waste excluding major mineral wastes. This shows a lower increase of 6.4 % over the same period. For both waste generation types, there is a sharper increase in the last data point (2018). However, it should be noted that measuring total waste is a complex task, with data collection and data quality issues encountered.

Generally, a population increase could, of course, explain an increase in absolute amounts of waste generated. However, the EU-27 population was relatively stable between 2008 and 2018, so the reasons for the increase in waste generation cannot be attributed to demography. The EU's gross domestic product (GDP) ([1]) in the same period of time increased by 20.4 %, at a much faster pace than the waste generated. This means that the EU as a whole has achieved relative decoupling, but has not yet achieved waste prevention measures' main objective of actually reducing the waste generated while the economy grows.

([1]) GDP here includes the contribution of mining and also demolition that result in the waste excluded from the graph in Figure 2.1. Although this limitation is acknowledged, the contribution to GDP from these activities is very small.

Figure 2.1 **Waste generation development compared with gross domestic product (GDP) and population in the EU-27**

Percentage

By 2013, most EU Member States put in place their waste prevention programmes in line with the mandate from the 2008 WFD. Looking at the waste generation trends in Figure 2.1, there is no observable impact of the adoption of the programmes at EU level. In fact, waste generation, excluding major mineral wastes, increased by 5.2 % between 2014 and 2018.

Waste intensity expresses waste generation per unit of GDP, reflecting the economy's 'eco-efficiency' in terms of the levels of waste generated (Eurostat, 2020a). This term and subsequent indicator is part of Eurostat's circular economy monitoring framework. Waste intensity also reflects the structure of the economy, as a services-based economy is less waste intensive than an industry-based economy. However, given that the structure of the economy changes at a relatively slow rate, changes in waste intensity are likely to indicate trends towards decoupling. For the EU-27, the waste intensity (for total waste, excluding major mineral waste), decreased from approximately 68 kg/EUR 1 000 GDP in 2008 to around 60 kg/EUR 1 000 GDP in 2018, which is a significant improvement, in spite of the EU not achieving

absolute decoupling. The 2016-2018 change led to the largest drop in waste intensity, because although waste generation increased at a faster pace than before, the acceleration of the economy was even faster. This demonstrates the usefulness of waste intensity as a metric for monitoring progress towards decoupling waste generation from economic growth.

These changes in waste intensity are the combined effect of various developments that either increase or decrease waste generation, specifically continuous economic growth (a key driver of waste generation) and at the same time the improved efficiency of production processes (as highlighted by Eurostat indicators on resource productivity) [2]. It is not possible, however, to quantify the effect of waste prevention measures that have been implemented by the EU countries during this period, as the effect of prevention measures can rarely be assessed quantitatively and unilaterally against waste generation. On the other hand, we cannot exclude the possibility that the emphasis given to waste prevention in the 2008 WFD may have resulted in, for example, improvements in waste intensity.

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[2]   https://ec.europa.eu/eurostat/statistics-explained/index.php?title=Resource_productivity_statistics

To highlight the relevance of these contributing factors, a decomposition analysis was conducted to assess the effect of certain driving forces on waste generation (Hoekstra and van der Bergh, 2006), decomposing the change in a macro indicator (waste generation) between two points in time into the contributions from the changes in the determinants (in this case, economic growth and waste intensity).

Figure 2.2 shows the result of this analysis: the change in waste generated per capita over time (taking 2008 as the reference year) is depicted as the combined effect of increased GDP and decreased waste intensity. An increase in GDP alone would lead to an increase in waste generation and a decrease in waste intensity would lead to a decrease in waste generation. The figure shows the net effect of these two developments combined.

The orange line indicates that waste generation per capita decreased slightly in 2010 and 2012, mainly because of the economic crisis; Between 2010 and 2012 the effect of the increase in GDP on economic growth (in blue) was overcompensated for by decreased waste intensity (grey bars). The struggling economy grew so slowly that technological and organisational improvements were able to reduce the total generation of waste in Europe. Since 2014 the relation between the two effects has been reversed, leading to a significant increase in waste generation per capita of almost 100 kg.

The pace of economic growth based on increasing turnover in industry and increased consumption expenditure by households has outrun efforts to reduce waste generation per euro of value created.

The analysis highlights that an actual and significant decoupling of waste generation and economic growth has not been achieved over the last decade. The total generation of waste is still closely linked to GDP growth rates. The analysis of waste prevention programmes and other activities aimed at avoiding waste generation (see following sections in this chapter) has shown a slight increase in the stringency of such measures (e.g. showing a higher share of regulatory measures compared with just informative measures, such as awareness raising campaigns); nevertheless, this is not yet reflected in the actual outcomes that still indicate rather linear patterns of production and consumption. A more detailed analysis of the available data shows a very close relation between decreasing waste intensities and a rising share of the service sector in the EU-27. New business models based on 'pay per use' seem to contribute to waste prevention, but of course the rising share of the tertiary sector — from 33.9 % to 39 % of the EU-27 GDP between 2008 and 2018 — also reduced the share of especially waste-intensive production processes in Europe. Further analysis should focus on the extent to which such processes have just been outsourced to other regions.

Figure 2.2   Decomposition analysis of waste generation (excluding major mineral wastes)

Percentage

Map 2.1 **Percentage change in generation of waste per GDP unit between 2008 ([a]) and 2018 (excluding major mineral waste) and population per country**

Note: Waste generation is given for 2018 as kg/capita.

([a]) 2008 was selected as a reference year so that a large enough time interval was created for monitoring developments in waste intensity. However, it should be noted that, for some countries, the effect of the economic crisis of 2007-2011 might have affected the levels of waste generation and GDP in 2008.

Sources: Eurostat (2021a, 2021b).

2.1.2   Country level

Map 2.1 illustrates the evolution of waste intensity as the generation of waste (excluding major mineral waste) per unit GDP from 2008 to 2018. Positive values in Map 2.1 indicate that the increase of waste generation has exceeded the economic growth (in terms of GDP) within that period, whereas negative values indicate a successful relative or absolute decoupling of waste generation from economic growth. Map 2.1 also shows the population change in the same period (2008-2018) and the level of waste generation in 2018. In most cases, the population change

is not large enough to explain sufficiently the changes in the waste intensity. In some countries with positive developments in waste intensity (negative values in Map 2.1), population increased, such is the case in Austria, Finland, Iceland, Turkey and Sweden. In countries that were also successful in decoupling the waste generation from economic growth, such as Romania, Lithuania and Hungary, the population did decrease, but this alone cannot justify the changes in waste intensity. On the other hand, Latvia is the only country where the population decrease was higher than the reduction in waste intensity, meaning that the improvement in Latvia can be explained by the population change. In the countries where waste intensity increased between 2008 and 2018, the

population increase was always smaller than the increase rate of waste intensity and therefore this cannot be the only reason for the changes in waste intensity.

In total, only 7 out of the 30 countries in Map 2.1 show an increasing waste intensity, while 12 show a strong (more than 10 percentage points) decrease. Ireland shows the highest increase in waste intensity, meaning that its waste generation far exceeded economic growth, while the opposite is the case for Romania. To account for factors influencing waste intensity, other than waste prevention measures, a deeper investigation of the economic structure of the countries would be needed, but that exercise is outside the scope of this report. Note that changes in data collection systems, data quality, waste classification and definitions might have played a role in the data in Map 2.1.

Despite the acknowledged complexity of assessing waste generation trends against economic developments, the main objective of the EU waste prevention policy, namely the absolute decoupling of waste generation from economic growth, has not been achieved yet. However, the fact that many EU Member States, and the EU as a whole, show a relative decoupling during the period 2008-2018 is an encouraging sign for future developments.

2.2 Overview of national and regional waste prevention programmes

The WFD required that Member States established waste prevention programmes no later than December 2013. The waste prevention programmes have been operating since then. The following Table 2.1 provides an overview of the current status and duration of the different regional and national waste prevention programmes. Based on the provisions in the WFD, some were developed as stand-alone programmes, whereas in some other countries the programmes have been included in waste management plans or strategies.

It can be observed that there is an increasing trend for countries to integrate waste prevention programmes in national waste management plans or other policy documents, such as their circular economy laws or strategies, as is the case in France, for example. One reason for this trend is that such an integration with waste management plans aligns the implementation period of a country's main strategic waste policy documents. This, however, might lead to gaps if a country is not covered by a waste prevention programme for a certain period.

Table 2.1 shows that 10 out of the 32 countries are not covered by a waste prevention programme in 2021. According to the WFD, waste prevention programmes have to be evaluated and revised at least every 6 years and, where relevant, in the event

of a legislative change in the WFD (see Article 30(1)). Given that all Member States had to have their first waste prevention programmes published in 2013, various Member States had planned to have a new waste prevention programme in place in 2019, 6 years after their first one. However, the amendment of the WFD in 2018 introduced a new approach to waste prevention and new requirements for EU Member States. Therefore, a number of EU countries are in the process of reconsidering their national waste strategies, including waste prevention. This report takes into account newly ratified waste prevention programmes where available, but it should also be acknowledged that the effect of the amended WFD is not yet reflected in all countries' waste prevention programmes.

Reflecting on the impact of adopting waste prevention programmes on waste generation, no observable trends can be seen. Figure 2.1 shows that waste generation has been unaffected by the wide adoption of such programmes by European countries in 2013. Moreover, looking at individual countries in the EEA waste prevention country profiles ([3]), the adoption of a waste prevention programme is very rarely correlated with a drop in waste generation afterwards.

Box 2.1   Example of the evaluation process in Germany

The German federal government adopted its first waste prevention programme in July 2013 under the title 'Waste prevention programme of the German government with the involvement of the federal states' ('*Abfallvermeidungsprogramm des Bundes unter Beteiligung der Länder*'). The German waste prevention programme is to be evaluated every 6 years and updated as necessary as per Section 33 of Germany's waste prevention mechanism, the Circular Economy Act (KrWG). Against this background, the German environmental protection agency (Umweltbundesamt) initiated a research project to evaluate the status quo of waste prevention in Germany. This included an assessment of waste prevention results and the institutional structures. Other aspects not previously addressed in the waste prevention programme were also to be examined to see whether or not they contribute to waste prevention. Specific proposals to possibly develop and update the programme were developed based on the results of the analysis referring to the current status of the implementation of the waste prevention programme at the federal, state and municipal levels and the evaluation of existing prevention potentials. Concrete proposals for measures concerning previously prioritised waste streams and relevant priority prevention approaches were developed to facilitate this.

Sources: UBA (2020).

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[3]   https://www.eea.europa.eu/themes/waste/waste-prevention/countries

The analysis presented in this report is based on the national waste prevention programmes presented in Table 2.1. More details referring to concrete objectives, targets, indicators, measures and monitoring schemes can be found in the EEA waste prevention country profiles. Tables 2.2-2.4) aim to provide an overview of the different aspects of these programmes.

Table 2.1   **Status and duration of waste prevention programmes in Europe by mid-2021**

EEA member countries	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025	2030
Austria													
Belgium ([a])													
Bulgaria													
Croatia													
Cyprus													
Czechia													
Denmark													2027
Estonia													
Finland													
France													∞
Germany													∞
Greece													2030
Hungary													
Iceland													2027
Ireland													
Italy													
Latvia													
Liechtenstein													
Lithuania													
Luxembourg													
Malta													
Netherlands													∞
Norway													∞
Poland													
Portugal													
Romania													
Slovakia													
Slovenia													
spain													
Sweden													
Switzerland													∞
Turkey													

Notes: The dark blue bars represent programmes updated in accordance with the revised WFD of 2018. The light blue bars refer to initial and partially still ongoing programmes. Grey cells indicate that no programme was in place in that year.

([a]) The Brussels and Flanders regional programmes end in 2023 and 2022, respectively, while the Wallonia regional plan ends in 2024.

2.3 Waste streams

Within the WFD (Article 9), waste prevention includes particularly the following streams: waste electrical and electronic equipment (WEEE), textiles and furniture, packaging, manufacturing and hazardous waste. Additionally, there is a special focus on the prevention of food waste.

The national waste prevention programmes include measures and targets for the specific waste streams in focus accordingly. Each country's selection of waste stream, however, is also related to factors such as waste volumes generated or economic importance (EEA, 2021), which may differ in different national settings. An overview of the waste streams considered in the national waste prevention programmes is outlined in Table 2.2.

Table 2.2   Waste streams considered in EEA member countries and regions

EEA member countries	Food/ organic waste (30)	Plastic/ packaging waste (30)	Textile (16)	Manufacturing waste (29)	WEEE (29)	Household/ municipal waste (28)	Hazardous waste (27)
Austria	✓	✓	✓	✓	✓	✓	✓
Belgium (a)	✓	✓	✓	✓	✓	✓	✓
Bulgaria	✓	✓	✓	✓	✓	✓	✓
Croatia	✓	✓		✓	✓	✓	✓
Cyprus	✓	✓	✓	✓	✓	✓	✓
Czechia	✓	✓	✓	✓	✓	✓	✓
Denmark	✓	✓	✓	✓	✓	✓	
Estonia	✓	✓	✓	✓	✓	✓	✓
Finland	✓	✓	✓	✓	✓	✓	✓
France	✓	✓	✓	✓	✓	✓	✓
Germany	✓	✓	✓	✓	✓	✓	✓
Greece	✓	✓			✓	✓	✓
Hungary	✓	✓		✓	✓	✓	
Iceland	✓	✓		✓	✓	✓	✓
Ireland	✓	✓		✓	✓	✓	✓
Italy	✓	✓		✓	✓	✓	✓
Latvia	✓	✓		✓	✓	✓	✓
Liechtenstein							
Lithuania	✓	✓		✓	✓	✓	✓
Luxembourg	✓	✓		✓	✓	✓	✓
Malta	✓	✓	✓	✓	✓	✓	✓
Netherlands	✓	✓	✓	✓	✓	✓	✓
Norway	✓	✓	✓	✓	✓	✓	✓
Poland	✓	✓		✓	✓	✓	✓
Portugal	✓	✓		✓	✓		✓
Romania	✓	✓		✓	✓	✓	✓
Slovakia	✓	✓	✓	✓	✓	✓	✓
Slovenia	✓	✓		✓		✓	✓
Spain	✓	✓		✓	✓	✓	✓
Sweden	✓	✓	✓	✓	✓	✓	✓
Switzerland	✓	✓	✓	✓	✓		
Turkey							

Note: (a) Note that the regional plan, as part of the Wallonia regional programme, does not cover textile and manufacturing waste.

Based on this overview, it can be stated that most countries have almost all types of waste materials covered:

- Hazardous waste, which is considered in almost all countries, is often addressed in specific strategies, e.g. in the Irish national hazardous waste management plan.

- Plastic, i.e. packaging waste, and food waste are focus points in all programmes that are covered by various types of measures.

- Textile waste, which has gained in importance as a waste stream, is considered in 16 programmes. Countries such as Belgium, Germany and Slovakia have included textile waste in their revised waste prevention programmes, whereas there had been no consideration of textile waste in their former programmes.

With respect to the recommendations of the revised WFD, countries already seem to have been considering WEEE, packaging, manufacturing and hazardous waste. Furniture is not yet broadly addressed as a standalone waste stream, but in some cases it is included in household waste prevention measures. Textile waste is not yet a focus in most countries, but the recent policy focus at the EU level (e.g. the forthcoming textile strategy) is expected to make textiles more prominently part of the next versions of waste prevention programmes.

Overall, it can be seen that the revision of waste prevention programmes is accompanied by an extension of the waste streams considered. Slovakia, for instance, includes the waste streams textiles and WEEE, which are additions in comparison to its former programme.

This overview also serves as a reflection of the countries' policy priorities. The fact that plastic and food waste are considered throughout all programmes can, for instance, be traced back to policy initiatives at the EU level; waste prevention programmes serve as a policy vehicle to address certain requirements. These two streams have long been recognised as having a significant potential for prevention, while the prevention of food waste is specifically included in the UN Sustainable Development Goals.

2.4   Indicators

The application of indicators is crucial to monitoring and assessing the waste prevention measures set in place. Given that the amendments in the WFD reorient the policy focus from the development of prevention strategies and programmes towards the implementation of prevention and its monitoring, indicators become essential elements for future prevention policies. Indicators ensure not only the monitoring of developments but also the evaluation of their effectiveness.

The waste Prevention indicators can thereby be manyfold, categorised into four types: (1) output-based indicators, (2) decoupling indicators, (3) response indicators and (4) indicators of specific waste prevention measures. While output-based indicators monitor the success of waste prevention measures in absolute numbers or percentages, decoupling indicators consider them in relation to economic values such as GDP. Response indicators relate to the process of waste prevention (such as number of measures) and, finally, indicators are grouped into specific waste prevention measures that do not relate to the aggregated effects of the programme but to specific prevention measures (such as cost-benefit). An overview of indicator types considered in the waste prevention programmes of the countries examined is provided in Table 2.3.

It can be seen that **output-based indicators** are covered in most of the programmes. These mostly refer to the generation of total or specific waste streams or to material flows such as household or municipal waste or construction and demolition waste (tonnes/year). Reuse rates are also considered; for example, Poland considers the percentage of packaging placed on the market that is reusable.

Decoupling indicators, which illustrate a nation's waste intensity or the waste intensity of a specific sector, are implemented in 11 out of 30 programmes. They are commonly expressed per unit of GDP (and per population) or gross value added (GVA). An example is Slovakia, where the indicator quantity of total municipal waste per unit of GDP and population is used.

Response indicators can cover a wide range of indicators. Denmark, for example, considers the number of enterprises with certified environmental management, the number of eco-labelled products and the degree of public awareness of them. Italy uses response indicators throughout various waste streams, such as the number of guidelines related to food industry by-products or the number of ethical procurement groups created.

Indicators linked to **specific waste prevention measures** (e.g. banning specific single-use plastic products) are included in nine programmes. Ireland, for instance, considers the money saved by comparing the costs of waste before and after the intervention. The region Flanders, on the other hand, considers the amount and cost of littering and illegal dumping and the number of rubbish bins.

Overall, it can be stated that indicators are relatively sparsely used throughout the countries, with output-based indicators being the most common type of indicator used. While some programmes involve indicators that cover up to three types of indicator, other programmes have not included any indicator. This can be the case for countries that predominantly define qualitative waste prevention targets, e.g. Norway.

Table 2.3   **Waste prevention indicators considered in EEA countries and regions**

EEA member countries	Output-based indicators (22)	Decoupling indicators (11)	Response indicators (18)	Specific waste prevention indicators (9)
Austria	X			
Belgium (a)	X		X	
Bulgaria	X	X	X	
Croatia	X		X	
Cyprus	X	X	X	X
Czechia	X		X	
Denmark	X	X	X	
Estonia				
Finland	X	X		X
France			X	
Germany	X	X	X	X
Greece			X	
Hungary	X		X	
Iceland	X	X	X	
Ireland	X		X	X
Italy			X	
Latvia	X			
Liechtenstein				
Lithuania	X	X	X	
Luxembourg				
Malta	X			X
Netherlands	X	X	X	X
Norway				
Poland	X	X	X	X
Portugal	X			
Romania	X		X	
Slovakia	X	X	X	X
Slovenia	X		X	
Spain	X	X	X	
Sweden				
Switzerland				
Turkey				

Note: The programme for the Brussels region contains no indicators, while the Flemish one includes only specific indicators.

2.5   Targets

Target setting is the cornerstone of policymaking in the area of waste prevention. Targets set the stage and calibrate the ambition of the overall waste prevention strategy and for specific waste streams if needed. Targets can drive the policy process, as they require:

• developing indicators for monitoring progress towards the target;

• indicating data requirements to measure progress;

• designing measures that would bring about the change commanded by the target;

• evaluating the effectiveness of the entire waste prevention programme at the end of its implementation.

The type of targets defined in the waste prevention programmes can be qualitative or quantitative. An overview of target types set throughout the Member States is outlined in Table 2.4.

A quantitative target is usually concrete and measurable. That is why it serves as a strong driver for waste prevention implementation. A successful implementation is, however, dependent on the availability of timely and robust data sets, which can be a limitation. Quantitative targets are included in 22 out of the 30 programmes reviewed. However, they mostly refer to one or two waste streams that are in focus in that country. Croatia and Estonia, for instance, have one central target on municipal waste prevention, whereas Austria's and Finland's quantitative target is to halve food waste by 2030.

When carefully planned, **qualitative targets** can provide evidence of successful actions. A few countries (e.g. Austria, Iceland, Norway and Slovenia) have identified qualitative targets only, while in most countries qualitative and quantitative targets exist. The qualitative targets defined within the waste prevention programmes are manifold but mainly refer to central waste streams (e.g. electronics, construction, municipal waste and hazardous waste). Slovenia and Iceland, for instance, have several measures in place that focus explicitly on hazardous waste prevention.

An ideal situation for national programmes is to use both types of targets in a blended approach. This is being done by a lot of countries. Particularly with regard to the updated programmes, the tendency is that quantitative targets have been put in place

where solely qualitative targets were considered before. This has been the case in Germany and Slovakia, and although Cyprus did not have any defined targets, the new programme includes both qualitative and quantitative targets. This development indicates countries making stronger commitments to waste prevention and is expected to bear measurable results in the coming years.

This leaves only two countries with no waste prevention targets: Hungary and Switzerland. Following the trend of other countries, however, targets might be set with their updated programmes.

The introduction of common waste prevention targets at the EU level would help harmonise efforts in countries and promote the development of solid policies around them. The efforts to achieve the targets would lead to measure being developed to support this, determine the waste streams to focus on and improve the monitoring of progress towards the set targets.

Box 2.2   Quantitative waste prevention targets in France

In 2020, France introduced a law on the circular economy and the fight against waste. This legislation introduces a large number of quantitative targets covering overall waste generation and also particular waste streams, such as plastic and food waste. These legally binding targets include:

• reducing household waste by 15 %;

• reducing the quantities of non-hazardous waste admitted to storage facilities by 30 % in 2020, relative to 2010, and by 50 % in 2025;

• recycling 100 % of plastic by 2025, driven and ensured by the national waste prevention and management policy through measures such as improved waste collection programmes;

• reducing the number of single-use plastic beverage bottles placed on the market by 50 % by 2030 (Article 66);

• halving food waste in distribution and collective catering by 2025 and food waste in consumption, production, processing and commercial catering by 2030, relative to 2015 (Article 11).

Table 2.4   **Waste prevention targets considered in EEA countries and regions**

EEA member countries	Quantitative targets (22)	Qualitative targets (23)	No targets (2)
Austria	▨	▨	
Belgium ([a])	▨	▨	
Bulgaria	▨	▨	
Croatia	▨	▨	
Cyprus	▨	▨	
Czechia		▨	
Denmark	▨	▨	
Estonia	▨	▨	
Finland	▨	▨	
France	▨		
Germany	▨	▨	
Greece		▨	
Hungary			▨
Iceland		▨	
Ireland		▨	
Italy	▨		
Latvia	▨		
Liechtenstein			
Lithuania	▨	▨	
Luxembourg	▨	▨	
Malta	▨	▨	
Netherlands	▨	▨	
Norway		▨	
Poland	▨	▨	
Portugal	▨		
Romania	▨		
Slovakia	▨	▨	
Slovenia		▨	
Spain	▨	▨	
Sweden	▨	▨	
Switzerland			▨
Turkey			▨

Note: The Brussels regional programme does not have quantitative targets.

2.6 Waste prevention measures

The WFD obliges the Member States to indicate specific measures by which the amount of waste and related environmental impacts are to be reduced.

The analysis of the national and regional waste prevention programmes highlights the broad range of measures already taken or under development in Europe. A total of 327 specific measures have been recorded, which cover measures initiated or undertaken by public authorities only — most countries and regions focus on similar sets of measures. This figure does not include the probably far bigger number of private initiatives by households or companies, e.g. professional online platforms that offer second-hand products.

It is important to note that this chapter considers national initiatives. However, countries have the opportunity to collaborate on or exchange best practices regarding waste prevention measures in international settings. At the EU level, a good example of a platform for such exchanges is the European Week for Waste Reduction (⁴), during which more than 10 000 waste prevention actions were logged in 2020 from 33 European countries. Other collaborative opportunities are offered through country networks such as the European Commission's waste working group and the EEA's Eionet. Good practice examples are systematically registered in the EEA's country profiles (⁵) for inspiration and, specifically for food waste prevention, at the newly launched EU Food Loss and Waste Prevention Hub (⁶).

2.6.1 Share of policy instruments

The waste prevention programmes cover a variety of policy instruments that can be grouped into the following four main types: (1) voluntary agreements, (2) regulatory instruments, (3) economic instruments and (4) information instruments.

1. Voluntary agreements refer to agreements among various stakeholders. They do not necessarily require a political decision-making process but rather require negotiations. In 2016, for instance, the Italian National Agency for New Technologies, Energy and Sustainable Economic Development (ENEA) launched a Symbiosis Users Network to enable industrial symbiosis in Italy. The network focuses on operational symbiosis issues to prevent waste and promote circular economy models.

2. Most waste prevention programmes include some regulatory instruments. Romania, for instance, launched a ban on landfilling food waste from wholesale, retail and distribution sectors from January 2023 onwards — forcing these stakeholders to explore prevention potentials more thoroughly. By contrast, in Austria single-use plastic bags have been banned since January 2020, following the rapid implementation of the EU Single-use Plastics Directive.

3. Economic instruments aim to set economic incentives for changes in consumption or production patterns by making less waste-intensive alternatives more attractive. This type of instrument involves tax regulations (e.g. Bulgaria and Sweden), the introduction of fees for plastic bags (e.g. most EU Member States) and other waste management operations so that 'waste-light' products or services become more competitive. The financial support for specific waste prevention measures can be counted as an economic instrument as well as an economic incentive for making sustainable purchases (e.g. Portugal).

4. Information instruments relate to campaigns for consumers or businesses. Romania, for instance, conducts awareness-raising campaigns on composting, the reduction of food waste and responsible paper consumption. The Netherlands, on the other hand, states that it will implement an eco-design knowledge platform enabling businesses to access knowledge on a permanent basis. The underlying assumption is that better access to information will change consumer habits or nudge companies towards taking up cost-saving opportunities.

Figure 2.3 illustrates that more than half of the measures included in countries' waste prevention programmes focus on the provision of information and awareness-raising. Of the measures listed in the waste prevention programmes, 6 % can be classified as regulatory instruments and 18 % as economic or market-based instruments. Voluntary agreements represent 22 % of the measures.

(⁴) https://ewwr.eu
(⁵) https://www.eea.europa.eu/themes/waste/waste-prevention/countries
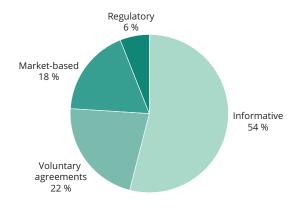(⁶) https://ec.europa.eu/food/safety/food_waste/eu-food-loss-waste-prevention-hub

Figure 2.3   Share of policy instruments

Regulatory 6 %
Market-based 18 %
Voluntary agreements 22 %
Informative 54 %

Notes: (ᵃ) Note that some countries are in the process of revising their waste prevention policies, so this figure is based on continuously evolving information.

Source: Own calculation based on the EEA country fact sheets on waste prevention (ᵃ).

Looking at the intervention points of the waste prevention measures, production- or consumption-focused policy instruments can be distinguished, such as the ban of hazardous substances as an example of measures in the production phase or the introduction of levies for plastic bags that primarily address consumers.

Based on the analysis of the prevention programmes for this report, 52 % of the measures address the production phase, including their design, and 48 % address the consumption phase of product life cycles. A relevant number also refers to the waste management sector aiming to set indirect incentives, for instance by increasing landfill taxes for municipal solid waste (here counted as measures that primarily address consumption patterns).

It is important to note that there are rare examples when a single measure of a specific type has resulted in effective waste prevention (e.g. the fees on plastic carrier bags). Usually, it is a combination of different types of measures that is most effective for implementing prevention measures. Therefore, it would be useful for countries to diversify their waste prevention measures portfolio and link that to concrete prevention targets.

On the other hand, this complexity and overlapping of measures targeting waste prevention makes it difficult to assess individual measures' effectiveness. Some countries make use of various proxy indicators to assess effectiveness (e.g. number of awareness-raising events taking place), but only in very rare cases is it possible to measure the effect on waste generation (e.g. levy on plastic carrier bags). For more details on evaluation, see the EEA guideline on evaluating waste prevention programmes (EEA, 2021).

Interestingly, only a very few waste prevention programmes include specific measures aimed at cross-country cooperation on waste prevention, e.g. the Nordic Swan ecolabel, aimed at, among other things, waste-light products.

2.6.1   Trends in policy approaches

Comparing the mapping above with the EEA's waste prevention report, published in 2016, which gave the first general overview on implementation approaches for waste prevention programmes (EEA, 2016), some trends can be highlighted. The share of information-based instruments that completely depend on voluntary actions by all stakeholders has decreased (-12 %), while the share of more stringent measures has increased (+10 %), including both economic and regulatory instruments.

It thes mainly plastic and packaging waste that has been addressed by such binding instruments. It seems that the intensive policy discourse and the high level of public awareness of the global problems —caused especially by plastic waste leaked into marine ecosystems — have led to the perception that voluntary actions alone will not be sufficient. A large share of these measures also refers to the EU Single-use Plastic Directive, which, inter alia, banned plastic straws and introduced levies on plastic bags (see EEA, 2019). A second waste stream that is increasingly addressed by market-based or regulatory instruments is food losses. Many countries have adopted national commitments to Sustainable Development Goal (SDG) 12.3, which demands halving of food losses by 2030.

At the same time, the number of newly initiated voluntary agreements has decreased slightly. It should be noted that this does not necessarily indicate an overall decrease in this policy instrument's relevance; many voluntary agreements are still in place and have proven to be effective, such as the Green Deals in the Netherlands (Green Deal, undated).

The total number of measures and their relative shares give only a first indication of the level of ambition, i.e. the relevance of specific policy instruments; the numbers, of course, cannot reflect the impact of a single measure that might differ significantly, for example between a regional awareness campaign and a comprehensive green public procurement programme.

With regard to specific waste streams addressed by public waste prevention measures, it can be observed that plastic packaging waste, food waste and WEEE have especially gained in importance. Qualitative prevention, defined as actions aimed at the phasing out of hazardous substances, is still of limited relevance. None of the waste prevention programmes include quantified objectives on qualitative waste prevention, methodological approaches and databases that would allow monitoring of progress in this area.

2.7 New waste prevention focus areas

The 2018 amendment of the WFD included new focus areas for waste prevention, with policy initiatives and data collection requirements envisaged at the EU level. These two main focus areas are food waste prevention and the promotion of reuse. Note that, according to the WFD, the EU Member States have to develop separate, although not necessarily standalone, food waste prevention programmes. The information presented below is derived exclusively from such programmes.

2.7.1 Food waste

Approximately 20 % (88 million tonnes) [7] of all produced food within the EU is wasted along the supply chain every year (Stenmarck et al., 2016). Consequently, food waste prevention has become one of the key priorities in most waste prevention programmes.

Reducing food waste has enormous potential for reducing the resources we use and the pollutants we emit to produce the food we eat. Acting more efficiently will increase the amount of food available for human consumption, save money and lower the wide-ranging environmental impacts of food production and consumption [8]. The EU and the individual countries aspire to achieving the target in SDG 12.3 to halve food waste per capita at the retail and consumer level by 2030 and to reduce food losses along the food production and supply chains. The EU Platform on Food Losses and Food Waste [9], established in 2016, which stimulates stakeholder engagement and knowledge exchange, supports this process.

As called for by the new farm to fork strategy, the Commission will seek to step up action to prevent food loss and waste across the EU. The strategy, part of the European Green Deal, puts forward a series of actions to accelerate the transition towards a sustainable EU food system that safeguards food security and ensures access to healthy diets sourced from a healthy planet. Reducing food loss and waste is an integral part of the strategy's action plan, which proposes to establish EU-wide food waste reduction targets by 2023 and revise EU date marking rules to prevent food waste linked to the misunderstanding and/or misuse of these dates (by end 2022).

The recently published EEA report on bio-waste emphasised once more the role of food waste by indicating that 60 % of bio-waste is food waste, of which a considerable share is avoidable (EEA, 2020). However, a reliable data baseline for quantifying the exact amount of food waste, i.e. for monitoring the progress on prevention, still needs to be established.

Measures on food waste prevention are included in 28 of the 32 national and regional waste prevention programmes. The countries and regions have introduced an array of policies and measures, including:

- prioritisation of actions against food waste, for better efficiency throughout the whole food chain (e.g. Austria, France, Netherlands, Spain);

- integration of the waste prevention hierarchy in their management plans or other legislation (e.g. Czechia, France, Germany, Hungary, Italy, Latvia);

- dealing with surplus food across the food supply chain, including through the creation of digital redistribution platforms (e.g. Croatia, Denmark, Finland, Netherlands);

- legislation that obliges supermarkets to donate unsaleable but edible food to social institutions or to use it alternatively as animal feed or as compost (e.g. France, Italy);

- donation of pre-packaged food labelled 'Best before ...' within the timeframe set in the recommendations (e.g. Lithuania);

- encouragement of food donations by fiscal incentives through tax credits and tax deductions (e.g. France, Portugal, Spain);

- voluntary agreements in the food sector with the aim of reducing food waste (e.g. Spain under the slogan 'Food has no waste — Use it');

- obligation to register as a food business operator for all charity organisations (that handle the food), including fulfilling requirements for liability, traceability and hygiene (e.g. Lithuania, Romania);

- guidelines for the prevention of food waste in the catering sector (e.g. Germany, Spain);

- implementation of action plans to reduce food waste (e.g. Austria, Sweden);

- provision of funds for research and innovation activities that help reduce food waste (e.g. Germany);

- educational activities in schools and/or professional training (e.g. Croatia, Czechia, Finland, Hungary, Italy);

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[7] This excludes food by-products used as animal feed.
[8] https://ec.europa.eu/food/safety/food_waste/eu_actions_en
[9] https://ec.europa.eu/food/safety/food-waste/eu-actions-against-food-waste/eu-platform-food-losses-and-food-waste_en

- awareness-raising and behaviour change campaigns for consumers (e.g. Germany's 'Too good for the bin!'; Latvia's 'Discarded is not gone'; Lithuania's 'Sincerely, food'; Spain's 'More food, less waste'), including dedicated events (e.g. Danish 'National Food Waste Day', Germany's 'Germany saves food!' awareness-raising week, the Netherlands' 'Waste-free Week');

- creation of certification schemes and labels (e.g. France's 'anti-food waste label', Luxembourg's 'Antigaspi' logo, Portugal's label for 'sustainable production and responsible consumption').

Box 2.3   Avoidable vs unavoidable components of food waste

The term 'food waste' comprises both avoidable and unavoidable food waste. Unavoidable food waste includes eggshells, banana peels or coffee grounds. Avoidable food waste, on the other hand, would still have been edible at the time of its disposal. This includes leftovers and ripe fruit. This distinction is not stable over time and region, as it depends on cultural eating habits, which vary around the world.

It is worth noting that the EU definition of food refers to food as a whole, including both parts intended and not intended to be eaten ('avoidable' and 'unavoidable'). This is also reflected in the measurement methodology established through dedicated legislation at the EU level; see Commission Delegated Decision (EU/2019/1597).

A great deal of effort is being put into education and awareness-raising campaigns, targeted at both producers and consumers. In this respect, multi-stakeholder dialogues are being launched and have resulted in voluntary agreements and declarations on monitoring or reducing food waste. Apart from the potential financial savings associated with reducing food waste, additional arguments have been provided to incentivise waste prevention, e.g. avoided greenhouse gas emissions.

Many of these initiatives have proven to effectively prevent food waste. At the same time, available estimations of efficiencies have often shown positive cost-benefit ratios: The avoidance of food waste can save significant costs, especially when considering mitigated environmental burdens (OECD, 2018).

The brief mapping of initiatives above shows that most countries are active in promoting food waste prevention. However, the measures implemented so far are relatively light, focusing on voluntary commitments or information provision. Many good practice examples are still at the stage of pilot projects and should be broadened by ambitious prevention policies, e.g. standardised date labels, obligatory reporting on

surplus product channels, intelligent packaging or mandatory offering of flexible portion sizes. Small portions for children and older people in restaurants.

On the other hand, countries have not yet dealt with food waste in a separate and comprehensive manner. The food waste prevention programmes, currently being developed across Europe, are expected to design food waste prevention policy in a more systematic manner and introduce more effective measures, targets and data collection systems for food waste.

2.7.2   Reuse

Reuse, examined in this section, is a waste prevention activity that refers to giving a second life to products without discarding them, meaning that the items do not enter the waste management system. Preparation for reuse refers to wasted products collected through a waste management system that undergo limited operations so they can be reused for the same function as before they became waste. Although reuse and preparation for reuse are high on the political agenda, both concepts remain rather vague in the eyes of policymakers. They include very different activities, such as individual sales at flea markets, organised waste management and third sector activities. Because of a lack of consensus on the conceptual framework, it has so far been difficult to make conclusions on the actual relevance of reuse and preparation for reuse in specific waste regimes. The question of whether progress takes place within the hierarchy, from disposal and recycling efforts towards more reuse, remains open.

One of the key barriers is the lack of available data and its poor quality, without which the development of more effective policies is not feasible. The revised EU WFD contains a number of provisions aimed at increasing reuse as an important form of waste prevention — and specifically aimed at developing a monitoring framework. The WFD envisages that the Commission will adopt an implementing act to establish a common methodology for reporting and monitoring the reuse of products, which was adopted in late 2020. Data produced in accordance with this legislation will be available for the first time in 2023, with reference to the year 2021.

Against this background, the European Commission initiated a study to provide input to the development of a methodology for measuring and reporting on the reuse of products and packaging and to establish formats for reporting as required under Article 9 of the WFD (Gsell et al., 2019).

When it comes to the reuse of packaging, screening of current practices has shown that 14 of the Member States that responded intend to make use of the proposals for action included in the EU packaging waste legislation and 65 % of the respondents stated that they have registers of producers of reusable packaging (Gsell et al., 2019). The preferences with regard to an indicator for measuring the reuse of packaging

were equally distributed among the following options:
(1) reusable packaging placed on the market for the first time as a share of all packaging placed on the market in a given year; (2) reusable packaging in rotation as a share of all packaging placed on the market in a given year; and (3) reuse of packaging measured as the share of the rotations that reusable packaging is used in relation to all packaging used in a given year.

However, waste prevention through reuse towards extending lifespans has gained importance for a number of product groups. The national waste prevention programmes reviewed list various types of measures, including:

- supporting the establishment of reuse centres and markets for used building materials, e.g. the network for the exchange of building components in Germany;

- preparing guidelines for public procurement on new development, renovations and infrastructure construction that is material efficient and supports the circular economy (Finland);

- expanding the reuse networks in the federal provinces (e.g. reuse of WEEE);

- providing information on opportunities for reuse;

- implementing an information and experience exchange platform for reuse (e.g. Austria);

- establishing procurement guidelines that facilitate reuse (e.g. adaptation of procurement law) or setting specific mandatory quotas for reused products;

- verifying tax law measures in the areas of reuse and repair in the framework of a green tax reform (e.g. Austria);

- organising campaigns to encourage reuse.

The analysis of different product groups has highlighted diverging framework conditions, economic incentives and market shares of reuse systems. While reuse is an established market model for cars, it is still in its infancy for many other product groups. The recent focus of EU legislation on reuse, as explained above, is expected to motivate European countries to intensify their efforts, especially with respect to product groups addressed by that legislation, namely electronics, furniture, construction materials and products and textiles ([10]).

> **Box 2.4   Reuse targets in Flanders (Belgium)**
>
> The Flemish government has approved an implementation plan to focus on waste prevention and reuse in 2016. The targets are to be achieved by 2022. A reuse quota of 7 kg/inhabitant is to be implemented by 2022 to surpass the target of 5 kg/inhabitant that has already been realised.
>
> **The following measures were defined to support reuse activities:**
>
> - develop action plans to achieve more efficient reuse (better communication, awareness-raising activities, more reuse centres, cooperation with other organisations and networks of repair cafes, etc.);
>
> - review the financing of the reuse sector and look for alternatives to include reuse in the product chain;
>
> - enter into dialogue with companies and organisations to raise awareness of the benefits of reuse and services provided by reuse initiatives;
>
> - organise activities to collect reusable goods;
>
> - investigate opportunities for and obstacles to new concepts for reusable baby nappies and for closing the material chain for disposable nappies.

2.8   Conclusions

The main policy objective for waste prevention in Europe is to manage an absolute decoupling of waste generated from economic growth. At the EU level, this decoupling has not been observed; total waste generation still closely follows economic developments. However, for the period 2008-2018, total waste generated in the EU increased at a much lower pace than the economy, signalling a relative decoupling.

It needs to be mentioned that waste extileon is influenced by many socio-economic factors, and it is difficult to assess the effectiveness of waste prevention measures, because there is no one-to-one causality between prevention measures and waste generation. Other demographic and socio-economic factors also affect waste generation, such as population and household size or the structure of the economy and its share of

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([10]) https://eur-lex.europa.eu/legal-content/EN/TXT/PDF/?uri=CELEX:32021D0019&from=EN

more waste-intensive(e.g. construction) or less waste-intensive (e.g. services) sectors. In this respect, the adoption of waste prevention programmes by EU Member States in 2013 does not appear to have a direct and measurable effect on total EU waste generation.

When looking at individual countries, 23 of the 30 examined show decoupling of waste generation from economic growth in the period 2008-2018. In fact, 12 countries show a very high decrease in waste intensity, defined as waste generated per unit GDP.

The analysis has shown that 10 out of the 32 countries reviewed are not covered by a waste prevention programme (as of 2021). Only eight countries have updated their programmes according to the revised WFD. This has direct consequences for our analysis: as the new strategic orientation for waste prevention policy, its links with the circular economy agenda and the streams that are more in focus are not yet reflected in the overview of waste prevention efforts in Europe. However, this might indicate a thorough overhaul of waste policy in countries where waste prevention policies will be aligned with broader waste management policies and circular economy strategies, unlocking the potential for synergies.

The waste prevention programmes in place mainly target municipal waste, plastics and food waste, also reflecting policy priorities at the EU level. However, a widening of waste streams has been observed along with the updates. Other streams in focus are hazardous waste, electronics and manufacturing waste.

More than half of the measures adopted by the waste prevention programmes examined refer to information provision and awareness-raising campaigns. There are indications that countries are moving towards more stringent prevention measures, and more regulatory or economic instruments, and moving away from information provision, which might indicate more effective waste prevention in the near future. However, the dominant type of waste prevention-related policy intervention is still to provide information and raise awareness. Shifting from simply informing stakeholders about prevention to increased policy pressure through legal instruments also indicates more maturity in policy developments around prevention.

However, to increase the effectiveness of waste prevention, countries need to further diversify their portfolio of measures and align it with concrete targets and indicators. When it comes to targets and indicators, they seem to not be widespread yet, presenting a challenge for monitoring the progress of waste prevention implementation. Forthcoming activities, particularly in the areas of food waste and reuse of products are expected to put these aspects more into focus. Overall, the amendment of the EU waste legislation in recent years provides countries with a good opportunity to revise their waste prevention programmes and integrate these suggestions into their official policy and review the lessons learnt from the evaluation of expired waste prevention programmes (see EEA, 2021).

On the other hand, new policy initiatives, under the context of the EU's circular economy action plan are expected to have a positive effect on waste prevention. Policy measures to support eco-design and in particular design for longevity for a number of consumer products (e.g. electronics and textiles) should in principle have an effect on the waste generation of these product groups. Similarly, initiatives that aim to extend products' lifespans, such promoting repair and remanufacturing, would delay products from becoming waste. Overall, the spirit of the circular economy, which aims to retain the value of materials and products in the economy as long as possible, translates into waste prevention, as the less waste is produced the longer we keep using existing products.

3 Preventing textile waste in Europe

3.1 Introduction and scope

The textile industry is highly globalised, with millions of producers and billions of consumers spread across the world in highly linear value chains involving raw material extraction, production, transport, consumption and the end-of-life phase. Between 2000 and 2014, the global production of clothing almost doubled, while the number of garments purchased by the average consumer increased each year (Ellen MacArthur Foundation, 2017). In addition to the decreasing product quality and low product prices, the continual changes in fashion led consumers and the industry to treat clothes as 'disposable' goods (Remy et al., 2016). This phenomenon is captures in the expression 'fast fashion'. Fast fashion refers to low-cost clothing collections that imitate current luxury fashion trends (Joy et al., 2012); it is made possible by advanced technology, quick manufacturing and supply chain control (Barnes and Lea-Greenwood, 2006). Fashion trends at low prices encourage disposability and rapid turnover and they consequently lead to large amounts of waste (Fletcher, 2014).

As a result, the textile product system and the corresponding textile waste are very relevant for applying waste prevention: growing waste stream, intensive and increasing consumption of products and short lifespans. This is recognised by the EU's 2020 circular economy action plan, which specifically addresses the textile value chain and has a strong focus on reuse and the extension of product lifetime, which is one key pathway towards waste prevention.

Against this background, this study aims to examine and assess the feasibility of preventing textile waste in Europe. More concretely, it assesses the textile life cycle from a waste prevention perspective by following these steps:

- compiling knowledge of textile flows and related environmental impacts;

- understanding the key drivers of textile waste generation along the value chain in order to scope prevention efforts accordingly;

- providing an overview of national textile waste prevention programmes and other policies and implemented practices aiming at textile waste prevention;

- reflecting on intervention points along the textile value chain towards waste prevention.

The study encompasses clothing and household textiles (e.g. clothes, towels, bed linen, curtains), while it excludes products in which textiles are not the dominant constituent (e.g. carpets, pillows, duvets). This means that clothing and home textiles consumed by households and by government and business (e.g. uniforms used by the public and private sectors, bed linen and towels used by hotels and restaurants) are considered in the scope of the study. On the other hand, technical textiles that are not directly consumed by households (e.g. medical or automotive textiles) are not within the scope of this report. In the following sections, the term 'textiles' is used in line with the scope of the report as described here.

3.2 Production and consumption of textiles in Europe and related environmental impacts

3.2.1 Production and consumption of textiles

Textiles and clothing represent an important manufacturing sector in Europe, making Europe the second largest exporter of textiles and clothing in the world, after China (Euratex, 2020). Europe is a leading region for the production of high-quality clothing and it is highly innovative in textile research and textile design (ETC/WMGE, 2019; Euratex, 2020). In 2018, the European textile and clothing industry comprised about 171 000 companies employing 1.7 million people and generating a turnover of EUR 178 billion (Euratex, 2019). Over 99 % of companies are micro enterprises or small or medium-sized enterprises (SMEs) and 67 % are active in clothing (Euratex, 2020).

In 2018, the EU-27's domestic production of clothing and household textiles (finished products) was just under 1 million tonnes; however, the volume of imported clothing and household textiles was over 5 million tonnes (Figure 3.1). China, Turkey, Bangladesh and India are Europe's most important trade partners (ETC/WMGE, 2019).
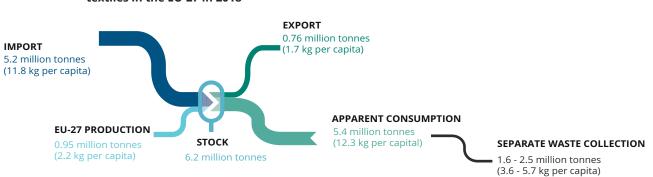
Figure 3.1 **Overview of the import, export, production and consumption flows of clothing and household textiles in the EU-27 in 2018**

IMPORT
5.2 million tonnes
(11.8 kg per capita)

EXPORT
0.76 million tonnes
(1.7 kg per capita)

EU-27 PRODUCTION
0.95 million tonnes
(2.2 kg per capita)

STOCK
6.2 million tonnes

APPARENT CONSUMPTION
5.4 million tonnes
(12.3 kg per capital)

SEPARATE WASTE COLLECTION
1.6 - 2.5 million tonnes
(3.6 - 5.7 kg per capita)

Notes: 'Stock' represents the total flow of clothing and household textiles through the EU-27 economy.
Source: JRC (2021).

While quantitative estimates are highly variable across sources, it is estimated that the apparent consumption of clothing and household textiles ([11]) of EU-27 households was 5.4 million tonnes in 2018, of which clothing accounted for 4.4 million tonnes (81 %, 10 kg per capita) and household textiles just over 1 million tonnes (19 %, 2.3 kg per capita) (JRC, 2021). This is a 20 % increase in apparent consumption since 2003.

When looking at the textile product system through a waste prevention and, broadly, circular economy lens, it is interesting to reflect on the type of clothing and household textiles consumed, as some items have greater potential for longer use, repair or reuse than others (JRC, 2021). For example, each year EU households purchase over 2.6 million tonnes (6 kg per capita) of coats, jackets, suits, shirts and trousers, which are often discarded before the end of their technical lifespan (e.g. because of fashion trends, the desire for new clothes or a lack of repair skills). As a result, these items have a high potential for reuse and are typically sold in second-hand shops across or outside Europe. On the other hand, items such as underwear, pyjamas, hosiery and handkerchiefs (just under 80 000 tonnes a year, 1.3 kg per capita) are more likely to be used by their first user until the end of their technical life and are less attractive items for reuse (JRC, 2021). These typically end up in mixed waste. Household textiles, especially when used in a business context (e.g. bedlinen from hospitals and hotels) are interesting feedstock for recycling, as such waste streams have considerable volumes of consistent quality, but it can be assumed that they are rarely discarded before their service life ends and are thus unsuitable for reuse.

A recent study in the Netherlands concluded that 5.6 % of mixed household waste in the country was textiles. Of that quantity, around one quarter is textiles that are suitable for reuse (https://www.afvalcirculair.nl/publicaties). This indicates that the reuse potential for household clothes and textiles is currently not exhausted.
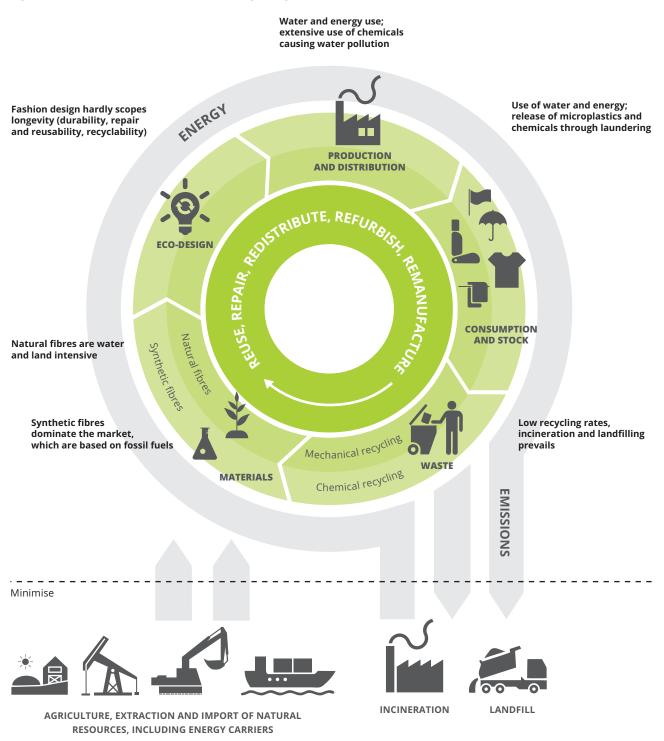
3.2.2 Environmental impacts of the textile industry

The circular economy action plan states that 'textiles are the fourth highest pressure category for the use of primary raw materials and water, after food, housing and transport, and the fifth for GHG [greenhouse gas] emissions' (EEA, 2019; European Commission, 2020b). The predominantly linear system of the textile industry is based on selling high volumes of short-lived clothing, which requires large amounts of natural resources associated with negative societal and environmental impacts and waste generation (EEA, 2019; ETC/WMGE; 2019). The production and consumption of textiles and clothing, in particular, have significant environmental effects, including resource and land use, greenhouse gas emissions and pollutant release. Prevention of textile waste by avoiding overconsumption and premature discard can thus prevent corresponding high environmental impacts.

Figure 3.2 gives an overview of the environmental impacts that textiles have across their life cycle. The production of natural fibres, such as cotton and wool, requires vast areas of arable land and uses large amounts of water, energy and agrochemicals. On the other hand, the manufacture of synthetic fibres, such as polyester and nylon, is based on fossil fuel resources. The type and magnitude of impacts depend on the type of fibre, but also on case-specific parameters, including specific production processes, the dyeing techniques used and fabric construction (van der Velden et al., 2014). As all fibres have their own environmental burdens and benefits, it is not straightforward to define a best-in-class fibre or fabric (Beton et al., 2014). The production of yarn and fabric, however, involves using a myriad of processing and finishing chemicals as well as energy (see Figure 3.2). Production wastes also include process water loaded with chemicals and cuttings.

([11]) Apparent consumption = production + import - export.

Figure 3.2   Environmental issues arising along the textile value chain

Water and energy use; extensive use of chemicals causing water pollution

Fashion design hardly scopes longevity (durability, repair and reusability, recyclability)

Use of water and energy; release of microplastics and chemicals through laundering

ENERGY

ECO-DESIGN

PRODUCTION AND DISTRIBUTION

REUSE, REPAIR, REDISTRIBUTE, REFURBISH, REMANUFACTURE

Natural fibres are water and land intensive

Synthetic fibres

Natural fibres

CONSUMPTION AND STOCK

Synthetic fibres dominate the market, which are based on fossil fuels

Mechanical recycling

Chemical recycling

MATERIALS

WASTE

Low recycling rates, incineration and landfilling prevails

EMISSIONS

Minimise

AGRICULTURE, EXTRACTION AND IMPORT OF NATURAL RESOURCES, INCLUDING ENERGY CARRIERS

INCINERATION

LANDFILL

Source: Based on ETC/WMGE (2019).

Recent studies show that, in some cases, there is a greater difference in environmental and climate impact between different manufacturers of the same fibres and materials than between different types of textile fibres (Rex et al., 2019). This is important, as 80 % of our textiles' total climate impact occurs in the production phase.

Consequently, the use of chemicals during production and processing is a particular field of concern. Many chemicals used in textiles pose a significant risk to water bodies and human health, and, as a consequence, many are restricted or banned by the EU, including certain phthalates, azo colours and dyes, perfluoroalkyl and polyfluoroalkyl substances (PFASs) for surface treatment, chromium (VI) in the tanning of leather for shoes and handbags, and dimethyl fumarate (DMF), a biocide used to prevent mould (European Commission, 2009). For example, the production of 1 kg of cotton t-shirts requires about 3 kg of chemicals, such as dyes and finishing agents (KEMI, 2014).

The release of microplastics as an environmental impact has gained particular attention in recent years. Microplastics are released during production and the use (washing) of textiles, including polyester, acrylic and nylon, and end up in waste water. As not all microplastics are filtered out in waste water treatment, a significant share eventually ends up in the ocean. It is estimated that globally about half a million tonnes of plastic microfibres are released each year (Ellen MacArthur Foundation, 2017). The long-term environmental and health impacts of microplastics pollution are still poorly understood (Henry et al., 2019; SAPEA, 2019), but as they are ingested by aquatic species, it is clear they may enter the human food chain, leading to chronic human exposure through food products (ETC/WMGE, 2021).

When considering the full supply chain, the EU consumption of clothing, footwear and household textiles comes out as the second highest environmental pressure in terms of land use (after food), the fourth highest for resource and water use, and the fifth highest for greenhouse gas emissions (EEA, 2019). In the use phase, washing, drying and ironing require water and energy; during these processes chemicals and microplastics are released into waste water. Figure 3.3 shows the environmental impacts per kilogram of clothing, footwear and household textiles consumed in Europe, with the impacts of the upstream value chain of textile products included.

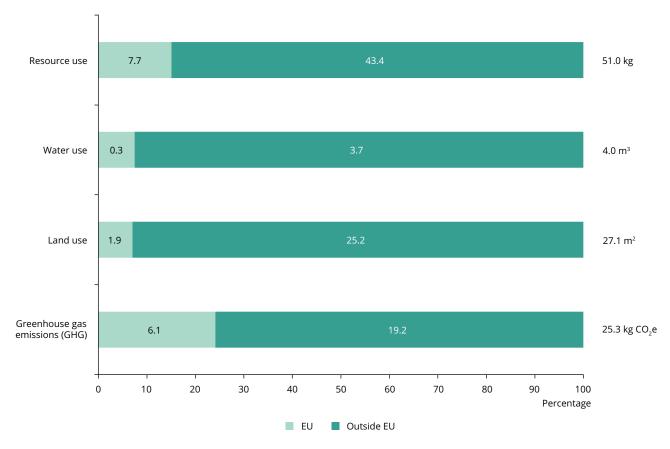**Figure 3.3   Environmental impacts in the upstream supply chain ([a]), per kg textiles consumed in Europe in 2017**

Notes: ([a]) This includes all activities in industrial and service sectors in the production and supply chain of the textile products up to purchase by households. It excludes the use of the textile products and their end-of-life treatment.

Source: ETC/WMGE (2019).

In total, the EU consumption of textiles was responsible for the emission of 335 million tonnes of CO_2 equivalent and the use of 360 000 km² of land, 53 000 million m³ of water and 676 million tonnes of primary raw materials (e.g. natural fibres, fossil fuels for the production of synthetic fibres, transport and processing, chemicals) (ETC/WMGE, 2019). Because a large part of the textiles that are consumed in Europe is imported from elsewhere in the world (mainly Asia), an important part of these environmental pressures is actually generated outside Europe. This is the case for 85 % of the material use, 92 % of the water use, 93 % of the land use and 76 % of the greenhouse gas emissions, making textiles [12] the consumption domain with the highest share of environmental impacts taking place outside Europe (ETC/WMGE, 2019).

3.3 Textile waste generation in the EU

3.3.1 The amount of textile waste

Currently, there is no requirement for Member States to report on the volumes of separately collected used textiles and there is no standardised mapping or classification methodology (i.e. whether or not certain used textiles are considered waste or not) (Eurostat, 2020c; JRC, 2021; Watson et al., 2018). As a result, data on separate collection are gappy and are often non-comparable between countries. Furthermore, collected amounts of used textiles vary greatly across countries (between 0.3 and 15.3 kg/person) (JRC, 2021).

It is estimated that about one third of textiles put on the market are collected separately, suggesting that two thirds end up in residual waste or are stocked. It is estimated that between 1.6 and 2.5 million tonnes of post-consumer textiles is separately collected annually, corresponding to between 3.6 and 5.7 kg/capita (JRC, 2021). As about two thirds of textiles are synthetic, an important share of this textile waste is of plastic origin (ETC/WMGE, 2021). Therefore, there is a significant amount of non-separately collected textiles that are collected mixed with residual waste, rendering them unavailable for recycling or reuse.

A large part of the textiles collected is meant for reuse (between 50 % and 75 %), either within the EU or exported for foreign markets (Watson et al., 2020). The largest share of the rest of collected textile waste is recycled, but mostly in lower grade products. Still, high-quality fibre-to-fibre recycling is virtually non-existent at the commercial scale on account of the many technical and commercial challenges (Textile Exchange, 2020), and textiles are generally downcycled into insulation or filling

materials (ETC/WMGE, 2021). The remaining two thirds of textile waste generated (about 4 million tonnes of textile waste) are assumed to end up in mixed municipal waste streams for incineration or landfill; there is thus an important opportunity for waste prevention by encouraging increased reuse. In countries with high separate collection rates, it can be expected that a significant share of textiles that ends up in the residual waste is of inferior quality; in these countries households already make a fair selection of those garments that are reusable (and are donated for collection) and those that are not (JRC, 2021).

3.3.2 Key drivers of textile waste generation

The increasing generation of textile waste cannot be traced back to one single driver but rather to a web of events that occurred within the past few decades, including a continuous drop in production costs as a result of mass production (Ozdamar Ertekin and Atik, 2015) and outsourcing of production labour. At the same time, a trend towards lower quality clothing has led to a decrease in clothing prices, making cheap mass-produced garments accessible to a wide audience. The acceleration of fashion trends, reduced product lifetimes and increased affordability have led to an acceleration in the consumption of clothing, resulting in increased waste volumes.
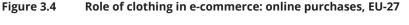
While average brands usually release around five collections per year, fast fashion brands provide up to 24 new clothing collections each year (Sajn, 2019). It is therefore not surprising that, between 2000 and 2014, the amount of garments purchased per person increased about 60 % globally. Within the same period, clothing production doubled and generated 14 items of clothing for every person on Earth in 2014 (Remy et al., 2016). It therefore may be considered that consumption in the textile industry is not necessarily driven by functional benefits but rather by the drive to satisfy emotional needs and by symbolic and social communication, also known as 'style consumption' (Cho et al, 2015). Hence, fast fashion has allowed everyone to consume style, follow the latest trends and meet their emotional needs (Gazzola et al., 2020).

The growth in the use of digital advertising and social media by fast fashion brands has caused a quickly shifting demand from consumers and created a 'buy now, throw away tomorrow' culture. A survey conducted by WRAP revealed that the lifespan of clothes has decreased and that they are also worn less often. In Europe, the average lifespan of a clothing item is currently up to 5 years (WRAP, 2019). Worldwide, the number of times a garment is worn has decreased by 36 % from 15 years ago (Ellen MacArthur Foundation, 2017).

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[12] Clothing, footwear and household textiles as calculated with Exiobase 3.4.

Digitalisation and data analytics have also served as an accelerator, helping fashion brands to develop a nimble and efficient supply chain that cuts down production cycles to less than 3 weeks. Inventory management systems (i.e. stock-keeping units) have therefore been established to track goods until purchased by the consumer, enabling fast fashion brands to quickly analyse and process data about each store's inventory levels and the popularity of each unit and the speed at which it sells.

In the meantime, a wide range of clothing has become accessible through a mouse click, a phenomenon largely accelerated during the COVID-19 pandemic. Clothes and sports goods are the top category of online purchases (see Figure 3.4). Around 65 % of shoppers in the EU state that they have purchased clothing online in the past 12 months. Around 70 % of these e-shoppers are aged 16-24 years (Eurostat, 2020b). According to a survey by Mastercard, 48 % of European consumers purchase their clothing and footwear online (Mastercard, 2017).

In addition to the growth in fashion e-commerce, return rates of unwanted clothing also increased. While almost 10 % of clothes purchased in stores are returned, the number of clothes purchased online being returned is three times higher, which relates to the inability to physically see, feel and try on the product beforehand (Statista, 2021). The journey of returned clothes therefore remains widely unknown. Returned clothes that are not damaged are usually sold at lower prices at discounters or outlets and/or become deadstock of retailers, which in general implies a system of 'overordering'. Depending on the returns policy, retailers have the chance to return their products to the supplier, who will re-sell those products to other markets or treat them as waste. This reverse flow along the supply chain is a crucial part of the clothing industry and is legitimised through overproduction, overordering and unregulated return policies (Shen and Li, 2015).

Figure 3.4   Role of clothing in e-commerce: online purchases, EU-27

Source: Eurostat (2020b).

Box 3.1   The role of e-commerce

Because of the ease of buying clothes, mobile applications and web platforms related to the circular economy and online shopping have grown significantly. Nevertheless, demand for circular economy products and alternatives is still rather low and most companies that have developed circular e-commerce models for textiles focusing on extended life cycles and reuse are small-scale businesses (Faria et al., 2020). The models may involve a pre-paid return label for the shipment of old and unwanted personal clothing items with each purchase and incentivising the consumer to participate in a return programme by offering discounts on the next purchase. Returned clothes can be resold or donated to select charities (Cision, 2019).

Data on the textile flows involved in e-commerce for the reuse of second-hand textiles are difficult to obtain. Informal reuse and the new market that has emerged via apps and the web are especially a challenge.

The Swedish Environmental Protection Agency study on e-commerce of second-hand clothing indicated that such activities increased 32 % in 1 year (2016—2017). The amount was approximately 0.13 kg per person, or equivalent to the weight of one cap. Women's clothes dominates the market and represents almost half of the textiles sold. Children's clothes represent about one third and men's about one sixth. Although the yearly increase in e-commerce of second-hand clothing and household textiles is remarkable, it amounts to only about 1 % of new sales (Elander et al., 2019).

3.4   Policy background on textile waste prevention

3.4.1   Global level

The UN agencies and allied organisations launched the initiative 'Alliance for Sustainable Fashion' in 2018. The main objective of this alliance is to contribute to the Sustainable Development Goals (SDGs) through coordinated actions in the fashion sector ([13]), such as through the promotion of active collaboration, knowledge sharing, strengthening synergies and outreach and advocacy. The UN committed to changing the path of fashion towards reduced environmental and social impacts, which resulted in the UN initiative 'SDGs for Better Fashion', addressing SDGs 4, 9, 12 and 13.

In addition to these efforts and the establishment of initiatives, such as the UN One Planet Network and the UN Environment Programme Circularity Platform, programmes aiming particularly at the prevention of textile waste have yet not been initiated in the EU.

3.4.2   EU level

The circular economy action plan (European Commission, 2020a) takes a broader approach and paves Europe's way to extil responsibility for its own waste. The textile value chain has been selected as a core sector and policy priority for the transition to a circular economy (European Commission, 2020a).

A sectoral plan for textiles is therefore part of the new circular economy strategy (2020a) and a is a priority in the European Green Deal (European Commission, 2019).

For 2021, the release of an EU strategy for sustainable textiles has been announced ([14]). The upcoming proposal by the Commission in this regard will eventually build on existing and new tools to promote the market for sustainable and circular textiles within the EU.

The Textile Regulation ((EU) No 1007/2011) on textile fibre names and related labelling and marking of the fibre composition of textile products ([14]), for instance, requires that textile products sold in the EU are labelled or marked to provide information about their fibre composition. Another significant body of the EU policy instrument is the REACH (Registration, Evaluation, and Authorisation of Chemicals) Regulation ((EC) No 1907/2006), which requires the registration of substances incorporated in textiles during production processes in Europe. Textiles produced outside the EU are regulated through the voluntary EU ecolabel for textiles (Commission Decision 2014/350/EU) and the EU green public procurement criteria for textiles products and services ([15]).

The revised Waste Framework Directive ((EU) 2018/851), with its overall goal of valuing waste as a resource, obliges all Member States to collect its textile waste separately by 2025. This regulation is expected to reduce the amount of textile waste ending up in residual waste and increase the amount that is available for reuse or recycling.

([13]) 'Fashion', as understood by the alliance, includes clothing, leather and footwear, made from textiles and related goods.
([14]) https://ec.europa.eu/growth/industry/sustainability/textiles_en
([15]) 'Textile product' means any raw, semi-worked, worked, semi-manufactured, manufactured, semi-made-up or made-up product that is exclusively composed of textile fibres, regardless of the mixing or assembly process employed.

JRC (2021) roughly estimated that the quantities of textiles separately collected will increase with 65 000 to 90 000 tonnes per year across the EU-27 from 2025. Reuse and recycling outlets will need to be created, as the current sorting and recycling capacities are not sufficient to process the anticipated volumes (Hardy, 2020). However, it is also expected that at least half of these additional volumes will comprise non-reusable textile waste (JRC, 2021).

3.4.3 EEA member countries' national and regional waste prevention programmes

Waste prevention programmes have been officially adopted by 30 EEA member countries: the 27 EU Member States and three non-EU countries that are members of the EEA (Iceland, Norway and Switzerland). An assessment of these programmes showcases the measures, indicators and targets envisaged for tackling textile waste prevention.

Measures

The slight majority (16 of 30) of waste prevention programmes in Europe already include measures that specifically address textile waste. In total, 40 measures have been recorded across all programmes. Some programmes. e.g. those of Denmark or Slovenia, have specific sub-chapters that deal with textile waste generation and linked environmental impacts.

The measures to prevent textile waste cover a wide range of types, from voluntary and simply suggested measures to market-based incentives and stringent regulatory market interventions. They mainly relate to the reuse and repair of textiles, i.e. the improvement of collection systems and market penetration of used clothes to enable, improve and increase their reuse (see Table 3.1). Furthermore, it was noted that agreements and partnerships tend to focus on awareness-raising campaigns and that regulatory measures, so far, focus on reducing the use of chemicals in textiles (part of qualitative waste prevention, referring to reducing environmental impacts from waste management).

Textiles and especially clothing might, of course, also be included in general waste prevention measures, such as in the support for reuse of discarded products in general. Additionally, textile waste prevention is considered as an action field in national and regional policy strategies and regulations beyond the waste prevention programmes (see Box 3.2).

Table 3.1   Examples of textile waste prevention measures listed in the 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 cooperation platforms	Partnerships with vendors to increase the market share of eco-labelled textiles or textiles that contain a minimal amount of harmful 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)**

Box 3.2   Examples of national and regional policy strategies and regulations beyond the waste prevention programmes

The Netherlands

The steps taken in the Netherlands over the past 10 years addressing the intervention points along the textile value chain can be highlighted as best practice. In 2012, the Netherlands introduced a Green Deal on textiles, with the overall goal of halving the quantities of textiles in residual waste between 2012 and 2015. The Green Deal aimed to achieve this through improved mapping of textile flows, common communications on what can and cannot be delivered to containers, initiatives aimed at behavioural change and assisting municipalities in setting achievable targets. This was followed by the Dutch Agreement on Sustainable Garments and Textile in 2016, signed by a broad coalition of partners, including industry associations, trade unions, non-governmental organisations and the Government of the Netherlands. These businesses and organisations thereby committed to extil measures towards a reduction of waste in the garment and textile sector in accordance with the European circular economy ambitions (SER, 2016). Furthermore, the Dutch circular textile programme 2020-2025 has also been implemented, setting objectives along the supply chain enabling long-term use and reuse of textiles (van Veldhoven, 2020). In 2021, additional goals/targets for reuse within the Netherlands were set in a progress report on the Dutch circular textile waste programme 2020-2025, which was presented to the Dutch parliament. By 2025, 10 % of textiles collected in the Netherlands needs to be reused within the Netherlands; by 2030 this should be 15 % (Government of the Netherlands, 2021).

Germany

With the amendment to the Circular Economy Act, the Due Diligence Act (in German 'Obhutspflicht') was introduced by the German government in 2020, marking a new form of product responsibility. It focuses on goods returned following online purchases as a critical factor for waste generation and refers to all products and their distribution processes (including transport and storing). By focusing on the textile industry in particular, the regulation represents an upfront duty to prevent textile waste (BMU, 2020). The Federal Ministry for Environment, Nature Conservation and Nuclear Safety (BMU) is currently conducting transparency dialogues with trade associations, online retailers, tertiary users and others to understand the underlying reasons for product destruction and how transparency on this matter could be achieved (BMU, 2019). Once transparency measures addressing the destruction of textile products are implemented, the volumes of textile waste in Germany can be estimated.and household textiles is remarkable, it amounts to only about 1 % of new sales (Elander et al., 2019).

Indicators

Currently, only 6 out of 31 national and regional waste prevention programmes include specific indicators on textile waste prevention (Box 3.3). The majority of these indicators focus on reuse or preparation for reuse of clothing and footwear. Some indicators also cover qualitative prevention (e.g. with regard to eco-labelled clothing) and the quantities put on the market — based on available consumer market statistics (e.g. the Icelandic programme uses indicators on consumer expenditure as an indicator for waste prevention).

Overall, the uptake of indicator in countries is hampered by the fact that textile waste statistics are not collected in all countries. Therefore, some countries resort to proxy indicators, such as the amount of textiles placed on the market, to estimate the effect of prevention measures. Other countries choose to monitor specific aspects of waste prevention, such as reuse, which is of course very relevant for textiles. However, not many countries have chosen to include specific indicators for monitoring textile waste prevention. This status might change with the introduction of the mandatory separate collection of textile waste in 2025 and the forthcoming EU textile strategy.

Box 3.3   Textile waste prevention indicators in national waste prevention programmes

Austria	Quantity of reusable used products (e.g. textiles) collected per year
	Quantity of reused products (e.g. textiles) sold annually
Cyprus	Quantity of materials (WEEE, clothes, furniture) re-introduced into the market (number of pieces)
	Repair of WEEE, clothing, furniture and toys (percentage)
Czechia	The amount of textiles, footwear and selected reusable products collected, in tonnes/year
Denmark	Consumption of clothing and textiles, including recycled items
	Trends in the prevalence of eco-labelled clothing and textiles
Iceland	The market share of clothing produced by environmentally friendly means or containing small quantities of hazardous substances
	Average household clothing purchases per year (adjusted for consumer price index, excluding housing)
Slovenia	The amount of textile waste and waste clothing
Netherlands	Overall reduction of waste
	Reduction in the amount of textiles discarded

Note: WEEE, waste electrical and electronic equipment.

Targets

None of the currently available waste prevention programmes include quantified **targets** for preventing textile waste. The Netherlands, however, recently adopted a reuse target of 10 % of textiles collected by 2025, increasing to 15 % by 2030 (Government of the Netherlands, 2021). Textile waste is nevertheless often mentioned in the context of general targets for municipal solid waste (e.g. in France) or with regard to waste products that are supposed to be collected separately in the future.

The absence of concrete targets is a major drawback of efforts to prevent textile waste, as a solid target drives the development of comprehensive policies, including subsequent measures to support the target and indicators for monitoring progress and data collection.

Conclusions on textile waste prevention in the national prevention programmes

Compared with prevention measures on other waste streams, such as plastics and packaging waste (see EEA, 2019), measures targeting textile waste are fewer in number but a higher share of textile-related measures aimed at qualitative prevention, inspired by the knowledge that chemicals in textiles might be harmful for humans (thus not targeting waste prevention directly).

The analysis also shows that, despite the increasing awareness of the steeply increasing amount of textile waste generated and the serious environmental impacts occurring along the value

chain, the issue of preventing textile waste has just started to gain attention and relevance in national waste prevention programmes. The circular economy action plan of the EU, which was recently adopted, puts extra emphasis on the textile product system. It is expected that the next versions of the national waste prevention programmes will increasingly adopt measures to address textile waste prevention across the board of targets, measures, indicators and data collection systems.

3.5   Intervention points for textile waste prevention along the life cycle stages

This section assesses waste prevention measures that can be undertaken throughout textiles' life cycle that lead to the reduction of textile waste. It highlights barriers to and success factors for the implementation of measures and draws conclusions to support policy options. As intervention measures can and should be considered at each stage along the value chain, the measures are discussed for each stage separately (for an overview of the value chain, see Figure 3.2).

3.5.1   *Product design*

Product design represents a crucial phase for the longevity of textiles through material choice, fibre blend and the production processes used (e.g. knitting or sewing techniques). The design phase also determines the potential for textiles to be recovered (i.e. recycled or upcycled; UNEP, 2020), which could also be considered waste prevention by avoiding environmental impacts from waste management (i.e. avoiding disposal). Eco-design is

the principle of designing for longevity, which again consists of three design principles: (1) design for durability, (2) design for long-lasting style and (3) design for disassembly (Circular Fashion, 2019). Design for durability aims to create textile products that are resilient to wear and tear and can withstand abrasion and washing, whereas design for long-lasting style aims to create timeless items that appeal to a broad audience by satisfying consumers' fashion sense. Lastly, design for disassembly aims to create products that can be taken apart easily to facilitate maintenance, repair, reuse or recycling (ETC/WMGE, 2019).

Ever more brands and businesses are establishing eco-design principles aiming for high-quality products with a long use phase and they therefore position themselves in new emerging 'slow fashion' markets. Some even follow the concept of 'zero waste design'. Technique-wise, zero waste design involves fitting all the flat pieces of the clothing pattern together like a jigsaw puzzle so that no fabric is wasted. Considering that roughly 15 % of the fabric is discarded when a typical garment is made, the cumulative effect of zero waste manufacturing can have significant environmental benefits (Wright, 2017). Labels and certification programmes addressing the longevity of textiles and/or including the aspect of longevity in existing labels and certifications can also provide an incentive for such waste prevention-compliant design.

An approach at the policy level has been made in the Dutch circular textile programme 2020-2025, which states that all textile products should be designed for long-term use by using materials that are long lasting and can be reused to a high standard (van Veldhoven, 2020). An extended producer responsibility (EPR) scheme for textiles to accelerate these processes is discussed (Government of the Netherlands, 2020). However, as ubiquitous incentives and regulatory measures to encourage eco-design are still missing, the consideration of longevity in the textile industry is lacking and compounded with a long implementation phase for such an initiative. This stage is therefore crucial, as it is the design phase that strongly determines the technical reusability, repairability and, hence, longevity of textile products (coupled with circular business models to recirculate unwanted textiles to new users).

3.5.2   Production and distribution

The production phase involves fibre and fabric production, cutting and sewing. Garment construction processes determine the quality of the resulting textile product, its durability and lifespan. Production systems for fast fashion are oriented more towards speed than quality, creating a vast amount of 'disposable' clothing. Gentle (i.e. sustainable) production systems with regard to chemical use in particular can ensure long-lasting clothing items that are recyclable.

One core issue at this stage, however, is the overproduction that generates large amounts of (unused) textile items ending up as waste. To prevent overproduction, some brands have embraced

a demand-driven model in which consumers pre-order garments. Moreover, brands could support customers to take an even greater guiding role in the development of clothing items by producing customised items on demand, based, for instance, on consumers' designs or simulations. Social media, bloggers, influencers and peer review play an important role in this trend.

Policy interventions for the textile production stage are not yet present at the European level. However, possible considerations of measures such as a ban on the destruction of unsold items (already in place in France and Germany and potentially to be included in the EU sustainable products initiative) or waste prevention targets for the production stage can influence the avoidance of production waste and incentivise the control of overproduction.

With the rising relevance of online clothing markets, slow fashion trends are required to adjust and reorient accordingly. While online platforms ease and accelerate the purchase of clothing, they also have potential for raising awareness and changing behaviour through the promotion of certain social norms (e.g. by 'green nudging'). Alternative business models (e.g. reuse or leasing) are therefore increasingly implemented by start-ups.

3.5.3   Use and maintenance

The use phase of clothing has shortened significantly over recent decades. This is to some extent explained by the lower quality of clothing items provided on the market but also by changes in consumption patterns and societal expectations of clothing. Apparel is no longer purchased to fulfil an essential human need but to meet seasonal fashion trends.

According to a survey, around one in five consumers purchase clothing items every 14 days and are 'high-frequency purchasers' (WRAP, 2019). Around half of consumers purchase monthly or every few months ('medium-frequency purchasers'), while one in three make purchases a few times a year or less ('low-frequency purchasers'). The study also reveals a high association between frequency of purchase and age, as people between 18 and 34 years are more likely to be classified as high-frequency purchasers. It is the same group that reports the shortest longevity of their clothing (WRAP, 2019). This reveals a clear group for targeting with awareness-raising campaigns on reuse and repair activities and new consumption models. It is, however, the same age group that is also targeted by fast fashion models and incentives to consume it on social media.

By encouraging consumers to use the concepts of longer use, reuse and shared use, the volumes of textiles purchased (and wasted) could be reduced. This, however, requires product design and logistics services supporting collaborative consumption models (Box 3.4). One barrier for reuse models such as second-hand clothing includes prejudices about worn clothing in terms of quality, hygiene or diversity of products on offer (Kleinhückelkotten et al., 2017).

Box 3.4   Examples of collaborative textile consumption models

Reuse: fashion library

An example of a collaborative consumption business model for extended life cycles of textiles is the clothing library, in which a monthly membership fee (often EUR 30-60) allows members to borrow a specific number of pieces of clothing in a set time, typically a few weeks.

Zamani et al. (2017) found that clothing libraries can extend the life cycle of a garment two to four times and proportionally reduce the production of new clothing and the associated waste generation and other environmental impacts.

Clothing libraries are typically small-scale enterprises, many of which are managed as secondary side businesses. The current impact on textile waste material flows is minor (Tojo et al., 2012), albeit steadily increasing. Several studies (Elander et al., 2017; Zamani et al., 2017; Yuan and Shen, 2019) report the importance of easy access and services (e-platforms and central locations of shops). Efficient logistics and good agreements with suppliers are crucial. Brand owners are generally quite positive about clothing libraries, even though one can see a contradiction with the retail model. Some brand owners have set up their own renting services, with the additional benefit of increased customer engagement and decreased product returns (Yuan and Shen, 2019).

Swap till you drop

A clothing swap is a type of swap meet during which participants exchange their valued, but no longer used, clothing for clothes that they will use. A clothing swap underlines the difference between 'end-of-use' and 'end-of-life' items and tries to get maximum use from end-of-use items (Rathinamoorthy et al., 2019).

As part of its 'Love your clothes' campaign, Milieu Centraal in the Netherlands is promoting the informal, non-commercial collaborative consumption system for clothing, called 'Swap till you drop' (Milieu Centraal, undated). It informs the consumer about the rules and benefits and gives practical advice on how to arrange clothing swaps. It also links to public clothing exchange events taking place at various locations in the Netherlands and to social media sites, where interested swap party organisers can post about their own event.

Despite the variety of awareness-raising campaigns that can be undertaken to address the challenges described, a certain attitude-behaviour gap remains, which raises questions about the alignment between awareness and actual actions to prevent textile waste.

Reuse or repair services could be encouraged by economic incentives, such as tax breaks. The Swedish government set economic incentives for the longer use of consumer items by giving tax breaks for repair services in 2017. The value added tax (VAT) for repair services, including those on textiles, decreased by about 50 % (from 25 % to 12 %). The rationale behind this is that, by reducing the overall costs of repair services, the use phase of items would be extended and waste prevented. Although an exact correlation cannot be drawn, an increase in shoe repair services has been noticed within the past few years (Dalhammar et al., 2020).

Recently, circular economy-inspired business models that promote sharing or leasing of clothes have been developed by new companies or by modifying the business models of existing companies. Most of these models target specific clothing types, such as long-lasting coats or baby clothes, which are more likely to be discarded by consumers before

their service life has ended. Although these models aim to use clothes as much as possible and avoid discarding them while still useful, there is currently no evidence on their effect on waste prevention. Depending on other factors, such as the cost of such leasing or sharing services, these models might risk increasing the number of clothing items in people's wardrobes and, perhaps, consequently increasing the production of clothes.

A common public policy measure that can promote circularity and waste prevention is green public procurement, which is increasingly seen as offering significant opportunities in this respect (Box 3.5). Green public procurement can encourage shifts towards the use of non-toxic chemicals in production, zero waste design and extended life cycles based on greater durability, reparability, etc. Public procurers can, for example, share assets (e.g. in terms of joint procurement and reuse) or set requirements that ensure a prolonged product life through maintenance, repair and design for durability (Alhola et al., 2018). Other sector-specific opportunities for circular public procurement aiming to prevent waste are extending the life cycle by renting workwear instead of owning it or setting requirements for the elimination of toxic substances, aiming to achieve qualitative waste prevention.

Box 3.5   Example of green public procurement and textile waste prevention

An example of successful textile waste prevention was given by the Herning municipality in Denmark. The aim was to extend the lifespan of working clothes and to ensure that the clothes and materials were used more efficiently. Detailed guidance on the criteria for the reuse, repair and disposal of working clothes was developed. Estimated savings for the municipality were EUR 6 700 and 1 011 t CO_2 over a 4-year period in Herning's technical operations department (Hillgrén et al., 2015). Extrapolating these figures based on the number of inhabitants in Herning implies that, if implemented at the national level, such a relatively easy measure would result in a saving of 117.1 Mt CO_2 for all of Denmark (with a saving of EUR 776 000 over 4 years for its 5.79 million inhabitants.

3.5.4   Reuse

High-quality textile reuse represents an opportunity for the European textiles industry to reduce its environmental impacts, providing that sufficient sorting capacity is available, including pre-sorting at source (e.g. separate collection of carpets, reusable clothing, denim, non-reusable items). By encouraging consumers to use textiles for longer and to repair, reuse and share their textiles, the volumes of textiles purchased and wasted could be reduced, despite potential rebound effects linked to the consumption of second-hand clothing. Currently, textile collection and sorting for reuse are often dominated by non-governmental organisations and charity organisations (Box 3.6). When the separate collection of textile waste is obligatory in all Member States after 1 January 2025, harmonisation of sorting procedures among Member States will be crucial to support efficient intra-EU trade of reusable textiles (ETC/WMGE, 2021).

EPR systems with eco-modulated fees are often proposed to encourage the collection of items for reuse and recycling, while stimulating the use of recycled fibres in new products. EPR schemes might lead to waste prevention directly in the case of the reuse of collected textiles without preparation or indirectly by, for instance, promoting durable textile design through eco-modulation. To date, France is the only Member State that has established a mandatory EPR scheme [16] (see Box 3.7) for clothing, footwear and household textiles (Article L-541-10-3 of

the Code de l'Environnement). According to this regulation, all legal entities presenting new textiles and clothing on the French market (i.e. garments, footwear and household linen) are held responsible for the end-of-life phase. As a consequence, the collection rate for reuse and recycling in France doubled from 18 % to 36 % between 2009 and 2017 (Bukhari et al., 2018; Ellen MacArthur Foundation, 2017). With 248 547 tonnes of textiles collected in 2019, the volume has risen by 42 % relative to 2014 (EcoTLC, 2019).

Box 3.6   The role of non-governmental organisations in textile reuse

Today, in the majority of European countries, the collection of used textiles is mainly handled by non-governmental organisations or charity organisations, which provide this service to get raw materials for their own activities, reselling or recycling. Finnish and Swedish reports indicate that the volumes collected are 3-4 kg/inhabitant (Belleza and Luukka, 2018; Dahlbo et al., 2016), which is in the same order as in France (3.18 kg/inhabitant per year), where the collection is more formal and arranged based on the french extended producer responsibility scheme for textiles (Bukhari et al., 2018).

Denmark has a well-developed market for the reuse of textiles through charity shops. In 2016, around 10 600 tonnes of textiles were reused in Denmark and around 15 300 tonnes were exported to be reused elsewhere (Miljøstyrelsen, 2018).

Typically, only a smaller share of collected textiles are going to domestic reuse. In Finland this is 21 %, and in Sweden and France even less. The bulk of all textiles collected are exported (Bukhari et al., 2018; Watson et al., 2020).

The markets for domestic, European and international reuse have been shrinking in the last few years. The quality of new clothing is becoming lower and the export of clothing to developing countries is becoming more difficult. The latter is because of the demand for better quality items and, moreover, some countries have placed bans on the import of used goods. In France, for example, the volumes of items going for reuse has decreased by between 10 % and 15 % during the last 3-4 years (Bukhari et al., 2018).

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[16]   An EPR promotes life cycle improvements in products by giving the manufacturer the responsibility for the final disposal phase in particular (Lindhqvist, 2000).

> **Box 3.7   The French extended producer responsibility scheme**
>
> The French extended producer responsibility scheme for clothing, footwear and home textiles purchased by households was introduced in 2007. Since then, companies that produce or import clothing, footwear or home textiles into French market have been held responsible for the collection, reuse and recycling of their products at the end-of-life stage.
>
> Under this regulation, producers can either organise their own collection, reuse and recycling system or contribute to an accredited producer responsibility organisation (PRO), which will carry out these activities. So far, EcoTLC has been the only accredited PRO in the area of textiles operating under a mandate that is negotiated with the government every 6 years. Since then, companies that produce or import clothing, footwear or home textiles into the French market are held responsible for the product at every stage of its life cycle, from eco-design, to the collection, reuse and recycling of their products at the end-of-life-stage. The mandate until the end of 2019 included targets of 50 % of textiles and footwear placed on the market to be diverted from residual waste streams by 2019, with at least 95 % of the textiles and footwear collected going for reuse, recycling or solid recovered fuel and no more than 2 % going to landfill. In December 2019, Eco TLC (now called Refashion) was given a mandate until 31 December 2022.

Under reuse, informal exchanges of clothes or online sales of used textiles can also be investigated. Exchanges of clothes between family and friends and the blooming of peer-to-peer online market platforms constitute a potentially significant part of textile reuse. However, no data exist on the amounts of such reused textiles in Europe.

Figure 3.5 outlines all potential measures and innovative steps that can be undertaken throughout the textile supply chain to prevent textile waste. Those steps outline business, consumer and policy options following the idea of a circular economy. Overall, textile waste can be prevented effectively by following the guiding principle of 'reduce by design', which is applied at the earliest stages of the value chain with the aim of reducing the number of materials, chemicals and waste. Additionally, retention loops, once implemented along the supply chain, can ensure the use of clothing to its maximum, guaranteeing extensive textile waste prevention. This could, for instance, take place through a shift in business models, informed consumers and transparent and traceable value chains.

3.6   Challenges and potentials for textile waste prevention in the EU

Alongside the value chain, there are different types of measures that have the potential to prevent the generation of textile waste by extending lifespans. A significant volume is assumed to be prevented by repair and reuse activities, which can be achieved through eco-design, collaborative consumption models, promoting emotional attachment to clothing and more.

As the actual quantity of textile waste generated remains widely unknown, quantitative assessments of the potential for prevention potentials have not been made so far. Estimates, however, have been made based on consumers' consumption and use behaviour or through surveys of unused clothing in households. WRAP, following a household study on clothing, came to the conclusion that 30 % of clothing in the average wardrobe has not been worn for at least a year, mostly because it no longer fits (WRAP, 2012). This reflects the volume of clothes that could be prevented from being thrown out if versatility were considered in product design, for instance. As the average household wardrobe is worth around EUR 4 400, the average consumer could save around EUR 1 320 over their wardrobe's lifetime by overcoming this inefficiency. The study further estimates that extending the active use of clothes for 9 months would save about EUR 5.5 billion of resources used in the supply, laundering and and disposal of clothing. An extension of the average life of clothes by 3 months per item would lead to a reduction of about 5-10 % in each of the carbon, water and waste footprint. According to a study by McKinsey, in which the economics of emission abatement within the fashion sector is illustrated, increasing the repairability of clothing would have the potential to extend the average use of clothing by 1 year (approximately 35 %) and reduce the overproduction of the clothing industry from 20 % to 10 % (McKinsey, 2020).

One key challenge remains the collection system. Between 1.6 and 2.5 million tonnes of textiles are collected out of the 5.2 million tonnes placed on the market (JRC, 2021). The Council for Textile Recycling indicates that all but 5 % of textile waste could be put to alternative uses if not disposed of in household waste. Hence, the obligation for Member States to implement a system of separate textile collection has considerable potential to eliminate textile waste from landfilling. However, increased waste collection does not necessarily lead to an equivalent increase in reuse. It might be argued that good-quality textiles already find their way to reuse currently, while lower quality textiles are thrown away. Therefore, an increased collection rate would make more textiles available for recycling, but maybe not as much for reuse.
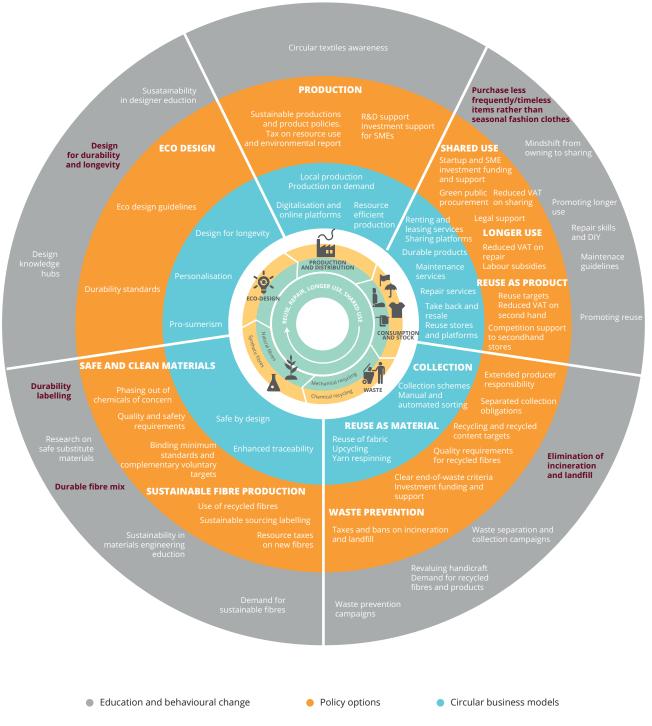
Figure 3.5   Textile waste prevention measures along the value chain, involving economic, political and societal innovations.

Source: Based on EEA (2019).

Table 3.2   Proposed textile waste prevention indicators

Indicator	Unit
Textile waste generation	kg/capita/year
New textile products put on the market by weight	kg/capita/year
Purchase of second-hand textile products by weight	kg/capita/year
Household expenditure on textile products	value/capita/year
Share of second-hand products in total textile products put on the market (weight or value basis)	%
Ratio (by weight) of exported second-hand products to total textile products put on the domestic market	%
Household expenditure on textile products per tonne of textile products put on the market	value/tonne
Repaired textile products	number/capita/year

Source: Based on Watson et al. (2013).

Furthermore, the complexity of drivers in combination with globalised production chains makes measures specifically challenging to address. Global production chains often lead to communication gaps between producers and designers, making the implementation of design-for-prevention ideas harder. The complexity of supply chains also makes the exchange of information and data difficult, leading to poor traceability of products.

A crucial point in this regard is the lack of available data. More comprehensive data sets would enable the creation of a robust evidence base and accelerate the implementation of indicators and targets. A number of indicators that could be used to measure textile waste prevention (when data are given) have been proposed by the Nordic Council (see Table 3.2). While data on household expenditure on textile products are widely available, data on the actual textile waste generated will most probably only be accessible after 2025, following the national implementation of the mandatory separate collection of textile waste.

3.7   Conclusions and future prospects

3.7.1   Key findings and policy options

The EU-27 plays a significant role in the textile industry. It involves large trade volumes and is counted the second largest exporter of textiles and clothing worldwide, after China. The expenditure on clothing and home textiles of European households increased over the past two decades, while its share in total household expenditure decreased; this, coupled with increasing numbers of clothing items put on the market, indicates a fall in the price of garments. These low price levels are the result of the fast fashion industry producing low-quality items very quickly. This and many other drivers of textile waste have been identified in this study. The drivers of textile waste are, however, closely linked to the opportunities for and

barriers to its prevention. Textile waste prevention is expected to overcome inherent fast fashion models, consumption patterns, established value chains and economic barriers. For instance, it has been shown that the demand for fast fashion can be narrowed down to a specific age group, which demonstrates which audience the awareness-raising campaigns could be tailored to (WRAP, 2019). However, the complex and highly globalised value chain and the lack of data on textile waste remain the key challenges.

The assessment conducted in the context of this report mapped the measures, indicators and targets addressing textile waste prevention within national waste prevention programmes. The assessment revealed about 40 measures that specifically address textile waste in Europe. By mapping the indicators and targets for textile waste prevention, a serious lack of such indicators and targets has been identified, which could drive further policy development in this emerging field towards preventing waste. The drivers of textile waste identified can, for instance, be addressed through technical, social and policy frameworks, such as the Dutch circular textile programme 2020-2025 or the Swedish VAT regulation on repair.

Based on the analysis of waste prevention drivers and the mapping of existing measures, the following policy options exist for reducing textile waste:

- **regulatory incentives** enforcing durability standards and circular design requirements or the banning of unsold goods;

- **stricter regulations** for chemicals within the textile industry increasing the longevity of textiles;

- **promotion of research and innovation** to develop durable and circular textiles and technological innovations (e.g. digital product passport for clothing; see example in Box 3.8);

- **promotion of collaboration** and exchange platforms between key stakeholders along the supply chain;

- **supporting actions** for techno-infrastructural developments for both collaborative business models and closed material loops;

- **producer awareness campaigns** on durability, repair and reuse (e.g. implementing repairability of clothing into product policy or establishing take-back systems);

- establishment of an **EPR** scheme, potentially harmonised at EU level, placing responsibility on producers for their products from their conception to their end-of-life phase, while setting an incentive for eco-design and reducing the cost of waste generated;

- **economic incentives** for consumers to use repair services (e.g. tax breaks) and green public procurement;

- clothing label and **certification programmes** addressing longevity of textiles and/or including the aspect of longevity in existing labels and certifications;

- **information for consumers** about the environmental impacts of their textiles through harmonised methods such as the EU's product environmental footprint;

- **cooperation among countries** towards finding a common methodology and a format for reporting textile waste collection and reuse capacities.

3.7.2 Future prospects

Regarding the future development of the textile industry, the Joint Research Centre (JRC) developed a vision statement that, by 2025, the textiles and clothing industry would be a strategic EU industry sector providing innovative products that enable services to be integrated and that the industry would operate according to a circular economic model (Bontoux et al., 2017).

The current linear textile value chain, however, is vulnerable to unpredictable events. Its lack of resilience was clear during the COVID-19 pandemic, when consumer demand collapsed and there were shortages of raw materials. This exacerbated the existing social and environmental issues of the textile industry. The difficulties related to the COVID-19 outbreak highlighted once more the importance of transforming the textile value chain into a more resilient and environmentally friendly industry. The implementation of circular economy principles in the textile industry is a key future approach and requires the engagement of stakeholders at all stages along the value chain.

To achieve circularity of textiles (and meet the JRC's vision by 2025) and, particularly, to foster textile waste prevention, will

require policy, economic and societal stakeholders to join forces. The steps that can be undertaken within each group are outlined in Figure 3.5, involving collaborative business models at the business level, the promotion of longer use and reuse at the policy level or a change in consumption habits at the societal level. The slow fashion trend, which strives to slow down the consumption and production processes within the textile industry, already induces fashion brands to establish new business models (see Figure 3.5) and consumers to purchase clothes wisely and less often (ETC/WMGE, 2019). A comprehensive transition towards a successful waste prevention, however, can only be achieved when distinct policy measures are put in place too.

Overall, the focus on waste prevention efforts in the textile sector is currently rather low across Europe. A more systematic approach in waste prevention policymaking is needed, with concrete targets, supportive measures, and robust data collection and exchange among the different stakeholders. However, the increasing importance of the textile sector in EU policymaking is expected to drive change at the national level in Europe, and the next versions of national waste prevention programmes are very likely to focus on textile waste. The forthcoming EU textile strategy, for instance, envisages proposing actions that enable bringing the textile industry into the concept of the circular economy. It ought to consider sustainable production and lifestyles, the use of chemicals, future textile waste collection and recycling in the EU Member States and it furthermore seeks to address these through reuse and recycling targets (European Commission, 2021a). These efforts will be accompanied by the forthcoming sustainable products initiative, which seeks to propose the necessary changes in the EU legal framework (European Commission, 2021b).

Box 3.8   Digital infrastructure for textiles in Estonia

TEXRoad is developing a sector-specific interoperable digital infrastructure. This will enable the distribution of fundamental textile data to key stakeholders (the public sector, industry and academia). According to the study 'Post-consumer textile circularity in the Baltic countries', about 73 % of materials going into the global clothing system ends up in landfill being incinerated. TEXroad wants to change that, as a large part of these textiles is still usable and could be reused, and another good proportion of the textiles could be recycled into new products. TEXroad believes that today's innovation vitally depends on data flows.

Find out more: https://accelerateestonia.ee/project/circular-textiles/ and https://texroad.org

Abbreviations

EEA	European Environment Agency
EPR	Extended producer responsibility
GDP	Gross domestic product
REACH	Registration, Evaluation, Authorisation and Restriction of Chemicals (Regulation)
SDG	Sustainable Development Goal
VAT	Value added tax
WEEE	Waste electrical and electronic equipment
WFD	Waste Framework Directive

References

Alhola, K., et al., 2018, 'Exploiting the potential of public procurement: opportunities for circular economy', *Journal of Industrial Ecology* 23(1), pp. 96-109.

Barnes, L. and Lea-Greenwood, G., 2006, 'Fast fashioning the supply chain: shaping the research agenda', *Journal of Fashion Marketing and Management* 10(3), pp. 259.

Belleza, E. and Luukka, E., 2018, *Svenska textilflöden- textilflöden från välgörenhet och utvalda verksamheter*, SMED Rapport No 2, Swedish Meteorological and Hydrological Institute, Norrköping, Sweden

Beton, A., et al., 2014, *Environmental improvement potential of textiles (IMPRO Textiles)*, European Commission, Joint Research Centre and Institute for Prospective Technological Studies (https://data.europa.eu/doi/10.2791/52624) accessed 15 November 2021.

BMU, 2019, *Treasure not trash — Waste avoidance strategies and ideas*, German Federal Ministry for the Environment, Nature Conservation and Nuclear Safety, (https://www.bmu.de/fileadmin/Daten_BMU/Pools/Broschueren/abfallvermeidung_wertschaetzen_statt_wegwerfen_en_bf.pdf) accessed 15 November 2021.

BMU, 2020, 'Die Obhutspflicht im Kreislaufwirtschaftsgesetz — novelle KrWG (§ 23 Absatz 1 Satz 3, Absatz 2 Nummer 11, § 24 Nummer 10, § 25 Absatz 1 Nummer 9 KrWG)', German Federal Ministry for the Environment, Nature Conservation and Nuclear Safety (https://www.bmu.de/themen/wasser-abfall-boden/abfallwirtschaft/abfallpolitik/kreislaufwirtschaft/die-obhutspflicht-im-kreislaufwirtschaftsgesetz) accessed 30 June 2021.

Bontoux L, Boucher P and Scapolo F. Textiles and Clothing Manufacturing: Vision for 2025 and Actions Needed. EUR 28634 EN. Luxembourg (Luxembourg): Publications Office of the European Union; 2017. JRC106917

Bukhari, M. A., et al., 2018, 'Developing a national programme for textiles and clothing recovery', *Waste Management & Research* 36(4), pp. 321-331 (https://doi.org/10.1177/0734242X18759190).

Cho E., Gupta S. & Kim Y-K. (2015). *Style consumption: its drivers and role in sustainable apparel consumption.* International journal of consumer studies, Vol 39, Issue 6.

Circular Fashion, 2019, 'Design for longevity' (https://circularfashion.com/key-principles/design-forlongevity) accessed 27 September 2019.

Cision, 2019, 'BUHO Introduces First-Ever Sustainable E-Commerce Hub Featuring Conscious Brands & B Corps Under One Roof', PR Newswire Association LLC, New York, NY (https://www.prnewswire.com/news-releases/buho-introduces-first-ever-sustainable-e-commerce-hub-300882558.html) accessed 15 November 2021.

Dahlbo, H., et al., 2016, 'Increasing textile circulation — consequences and requirements', *Sustainable Production and Consumption* 9, pp. 44-57.

Dalhammar, C. (Ed.), Richter, J. L. (Ed.), Almén, J., Anehagen, M., Enström, E., Hartman, C., Jonsson, C., Lindbladh, F., & Ohlsson, J. (2020). Promoting the Repair Sector in Sweden.

EcoTLC, 2019, *2018 Annual Report* (https://www.ecotlc.fr/ressources/Documents_site/EcoTLC_2018-Annual-Report_web.pdf) accessed 16 November 2021.

EEA (2016). *Prevention of hazardous waste in Europe – the status in 2015.* EEA report No 35/2016

EEA, 2019, *Textiles in Europe's circular economy*, EEA Briefing 10/2019, European Environment Agency.

EEA, 2020, *Bio-waste in Europe — turning challenges into opportunities*, EEA Report No 4/2020, Issue 4, European Environment Agency (https://www.eea.europa.eu/publications/bio-waste-in-europe) 25 November 2021.

EEA (2021). *Guidance for evaluating waste prevention programmes. Guidelines by the EEA and Eionet.* https://www.eea.europa.eu/themes/waste/waste-prevention

Elander, M., et al., 2017, *Evaluation of business models for increased reuse, collective use and prolonged life time of textiles*, Mistra Future Fashion Report No 2017:4, IVL Svenska Miljöinstitutet, Stockholm.

Elander, M., et al., 2019, *Återanvändning av extile via utvalda online marknadsplatser och appar: undersökning avseende åren 2016 och 2017*, SMED Rapport No 11, Swedish Meteorological and Hydrological Institute, Norrköping, Sweden.

Ellen MacArthur Foundation, 2017, *A new textiles economy: redesigning fashion's future* (https://www. ellenmacarthurfoundation.org/assets/downloads/ publications/A-New-Textiles-Economy_Full-Report.pdf) accessed 16 November 2021.

ETC/WMGE, 2019, *Textiles and the environment in a circular economy*, Eionet Report No 2019/6, European Environment Agency (https://www.eionet.europa.eu/etcs/etc-wmge/ products/etc-reports/textiles-and-the-environment-in-a- circular-economy) accessed 16 November 2021.

ETC/WMGE, 2021, *Plastics in textiles*. https://www.eionet. europa.eu/etcs/etc-wmge/products/plastic-in-textiles- potentials-for-circularity-and-reduced-environmental-and- climate-impacts accessed November 2021

EU, 2018, Directive (EU) 2018/851 of the European Parliament and of the Council of 30 May 2018 amending Directive 2008/96/ EC on waste (OJ L 150, 14.6.2018, p. 109-140).

Euratex, 2019, *Annual report 2018*, European Apparel and Textile Confederation, Brussels.

Euratex, 2020, *Facts & key figures of the European textile and clothing industry* (https://euratex.eu/wp-content/uploads/ EURATEX-Facts-Key-Figures-2020-LQ.pdf) accessed 16 November 2021.

European Commission, 2009, 'Consumers: EU to ban dimethylfumarate (DMF) in consumer products, such as sofas and shoes', Press release (http://europa.eu/rapid/press- release_IP-09-190_en.htm) accessed 16 November 2021.

European Commission, 2017, Staff Working Document 'EU green public procurement criteria for textiles products and services' (SWD(2017) 231 final, 6.6.2017, Brussels).

European Commission, 2019, Communication from the Commission to the European Parliament, the European Council, the Council, the European Economic and Social Committee and the Committee of the Regions 'The European Green Deal', COM(2019) 640 final, 11.12.2019, Brussels (https://eur-lex. europa.eu/resource.html?uri=cellar:b828d165-1c22-11ea- 8c1f-01aa75ed71a1.0002.02/DOC_1&format=PDF) accessed 16 November 2021.

*extileive*European Commission, 2020a, *Circular economy action plan — ex a cleaner and ext competitive Europe* (https:// ec.europa.eu/environment/circular-economy/pdf/new_ circular_economy_action_plan.pdf) accessed 16 November 2021.

European Commission, 2020b, *Guidance for separate collection of municipal waste*, European Commission, Brussels.

European Commission, 2021a, 'EU strategy for textiles', Roadmap, Ref. Ares(2021)67453-05/01/2021, European Commission, Brussels..

European Commission, 2021b, 'Sustainable products initiative — inception impact assessment', Ref. Ares(2020)4754440- 11/09/2020, European Commission, Brussels.

Eurostat, 2020a, 'Final consumption expenditure of households by consumption purpose (COICOP 3 digit)' (http://appsso. eurostat.ec.europa.eu/nui/show.do?dataset=nama_10_co3_ p3&lang=en) accessed 16 November 2021.

Eurostat, 2020b, 'Internet purchases by individuals (until 2019)' (http://appsso.eurostat.ec.europa.eu/nui/show. do?dataset=isoc_ec_ibuy&lang=en) accessed 16 November 2021.

Eurostat, 2020c, 'Treatment of waste by waste category, hazardousness and waste management operations [env_ wastrt]' (http://appsso.eurostat.ec.europa.eu/nui/show. do?lang=en&dataset=env_wastrt) accessed 16 November 2021.

Eurostat, 2021a, 'Generation of waste excluding major mineral wastes per GDP unit' (https://ec.europa.eu/eurostat/ databrowser/view/CEI_PC032__custom_354647/bookmark/ table?lang=en&bookmarkId=6861ca21-d5c8-4fc1-9d66- eabee18da732) accessed 16 November 2021.

Eurostat, 2021b, 'Population change — demographic balance and crude rates at national level' (https://ec.europa. eu/eurostat/databrowser/view/demo_gind/default/ table?lang=en) accessed 16 November 2021.

Faria, R., et al., 2020, 'Circular economy for clothes using web and mobile technologies — a systematic review and a taxonomy proposal, *Information* 11(3), 161 (https://doi.org/10.3390/ info11030161).

Fletcher, K., 2014, *Sustainable fashion and textiles: design journeys*, second edition, Earthscan, London.

Gazzola P., Pavione E., Pezzetti R. & Grechi D. (2020). *Trends in the fashion industry. The perception of sustainability and circular economy: A gender/generation quantitative approach.* Sustainability 2020, 12, 2809

Gsell, M., et al., 2019, *Study: methodology for the reporting of re-use of products and rules for the reporting of reusable packaging*, European Commission, Brussels (https://doi.org/10.2779/286270).

Government of the Netherlands, 2020, 'Appendix — policy programme for circular textile 2020-2025' (https://www.government.nl/documents/publications/2020/04/14/appendix---policy-programme-for-circular-textile-2020-2025) accessed 16 November 2021.

Government of the Netherlands, 2021, 'Voortgangsrapportage circulair extile' (https://www.rijksoverheid.nl/documenten/kamerstukken/2021/05/20/voortgangsrapportage-circulair-textiel (accessed 23 November 2021).

Green Deal, undated, 'About us' (https://www.greendeals.nl/english) accessed 16 November 2021.

Hardy, M., 2020, 'A concrete example of EPR applied to textile: the French experience', presentation given at extended producer responsibility and textile (online), 16 June 2020.

Henry, B., et al., 2019, 'Microfibres from apparel and home textiles: prospects for including microplastics in environmental sustainability assessment', *Science of the Total Environment* 652, pp. 483-494 (https://doi.org/10.1016/j.scitotenv.2018.10.166).

Hillgrén, A., et al., 2015, *Nordic best practices: relevant for UNEP 10YFP of sustainable consumption and production* (http://norden.diva-portal.org/smash/record.jsf?pid=diva2%3A905930&dswid=1383) accessed 16 November 2021.

Hoekstra R. & van den Bergh J. C. J. M. (2006). *The impact of structural change on physical flows in the economy: forecasting and backcasting using structural decomposition analysis.* Land Economics Vol. 82, No. 4

Joy, A., et al., 2012, 'Fast fashion, sustainability, and the ethical appeal of luxury brands', *Fashion Theory* 16(3), pp. 273-295 (https://doi.org/10.2752/175174112X13340749707123).

JRC, 2021, *Research into circular economy perspectives in the management of textile products and textile waste in the European Union*, Joint Research Centre. https://circulareconomy.europa.eu/platform/en/news-and-events/all-news/circular-economy-perspectives-eu-textile-sector

KEMI, 2014, *Chemicals in textiles — risks to human health and the environment — report from a government assignment*, Swedish Chemicals Agency (https://www.kemi.se/download/18.6df1d3df171c243fb23a98f3/1591454110491/rapport-6-14-chemicals-in-textiles.pdf) accessed 16 November 2021.

Kleinhückelkotten S. & Neitzke P. (2017). *Increasing sustainability in clothing production and consumption ￼ opportunities and constraints.* GAIA - Ecological Perspectives on Science and Society 28(1):240-248

Lindhqvist, T., 2000, *Extended producer responsibility in cleaner production: policy principle to promote environmental improvements of product systems*, International Institute for Industrial Environmental Economics, Lund University, Lund, Sweden (https://lup.lub.lu.se/search/ws/files/4433708/1002025.pdf) accessed 16 November 2021.

Mastercard, 2017, *Masterindex 2017: pan-European e-commerce and new payment trends*.

McKinsey & Global Fashion Agenda, 2020, *Fashion on climate — how the fashion industry can urgently act to reduce its greenhouse gas emissions*, McKinsey and Company, New York, NY.

Milieu Centraal, undated, 'Hoe organiseer ik een kledingruil?' (https://www.milieucentraal.nl/bewust-winkelen/kleding/hoe-organiseer-ik-een-kledingruil) accessed 16 November 2021.

Miljøstyrelsen, 2018, Kortlægning af tekstilflows i Danmark (https://mst.dk/service/publikationer/publikationsarkiv/2018/jun/kortlaegning-af-tekstilflows-i-danmark/) accessed 23 November 2021.OECD, 2018, *Working party on resource productivity and waste: business models for the circular economy — opportunities and challenges from a policy perspective*, Report ENV/EPOC/WPRPW(2017)1/FINAL (https://www.oecd.org/officialdocuments/publicdisplaydocumentpdf/?cote=ENV/EPOC/WPRPW%282017%291/FINAL&docLanguage=En) accessed 16 November 2021.

Ozdamar Ertekin, Z. and Atik, D., 2015, Sustainable markets: motivating factors, barriers, and remedies for mobilisation of slow fashion, *Journal of Macromarketing* 35(1), pp. 53-69 (https://doi.org/10.1177/0276146714535932).

Rathinamoorthy, R., et al., 2019, 'Clothing swap: gateway to sustainable eco-friendly fashion, in: *Handbook of Ecomaterials*, Springer International Publishing, Cham, Switzerland, pp. 1599-1622.

Remy, N., et al., 2016, 'Style that's sustainable: a new fast-fashion formula' (https://www.mckinsey.com/business-functions/sustainability/our-insights/style-thats-sustainable-a-new-fast-fashion-formula) accessed 16 November 2021.

Rex, D., et al., 2019, *Environmental impact of textile fibers — what we know and what we don't know*, Mistra Future Fashion Report 2019:3 (http://mistrafuturefashion.com/wp-content/uploads/2019/03/Roos-D2.1.1.1-Fiber-Bible-Part-1_Mistra-Future-Fashion-2019.02-1.pdf) accessed 25 November 2021.

Sajn, N., 2019, 'Environmental impact of the textile and clothing industry — what consumers need to know', European Parliamentary Research Service (https://www.europarl.europa.eu/RegData/etudes/BRIE/2019/633143/EPRS_BRI(2019)633143_EN.pdf) accessed 16 November 2021.

SAPEA, 2019, 'A scientific perspective on microplastics in nature and society' (https://www.sapea.info/topics/microplastics) accessed 6 February 2020.

SER, 2016, *Agreement on sustainable garment and textile*, Dutch Social and Economic Council (https://www.imvoconvenanten.nl/-/media/ser/downloads/engels/2016/agreement-sustainable-garment-textile.pdf?la=en) accessed 16 November 2021.

Shen, B. and Li, Q., 2015, 'Impacts of returning unsold products in retail outsourcing fashion supply chain: a sustainability analysis, *Sustainability 7*(2), pp. 1172-1185 (https://doi.org/10.3390/su7021172).

Statista, 2021, 'Internet sales as a proportion of all retailing: textiles, clothing, and footwear in the United Kingdom (UK) from January 2016 to September 2021 (https://www.statista.com/statistics/697350/proportion-of-retail-sales-made-online-textile-clothes-shoes-uk) accessed 23 November 2021.

Stenmarck et al. (2016). *Estimates of European food waste levels.* Available at: https://www.eu-fusions.org/phocadownload/Publications/Estimates%20of%20European%20food%20waste%20levels.pdf

Textile Exchange, 2020, *Material change insights report 2019 — the state of fiber and materials sourcing*. (https://textileexchange.org/wp-content/uploads/2020/05/Material-Change-Insights-Report-2019_Final.pdf) accessed 11 December 2020.

Tojo, N., et al., 2012, *Prevention of textile waste — material flows of textiles in three Nordic countries and suggestions on policy instruments*, Nordic Council of Ministers, Copenhagen (https://doi.org/10.6027/TN2012-545).

UNEP, 2020, *Sustainability and circularity in the textile value chain — global stocktaking*, United Nations Environment Programme, Nairobi.

van der Velden, N. M., et al., 2014, 'LCA benchmarking study on textiles made of cotton, polyester, nylon, acryl, or elastane', *International Journal Life Cycle Assess* 19, pp. 331-356 (https://doi.org/10.1007/s11367-013-0626-9).

van Veldhoven, S., 2020, 'Policy programme for circular textile 2020-2025', Ministry of Infrastructure and Water Management, the Hague, Netherlands.

Watson, D., et al., 2013, *Proposals for targets and indicators for waste prevention in four waste streams*, Nordic Council of Ministers, Copenhagen (https://www.diva-portal.org/smash/get/diva2:701984/FULLTEXT01.pdf) accessed November 2021.

Watson, D., et al., 2018, *Used textile collection in European cities*, Final Report, European Clothing Action Plan.

Watson, D., et al., 2020, *Towards 2025: separate collection and treatment of textiles in six EU countries*, Danish Environmental Protection Agency (https://www2.mst.dk/Udgiv/publications/2020/06/978-87-7038-202-1.pdf) accessed 16 November 2021.

WRAP, 2012, *Valuing our clothes: the cost of UK fashion* (https://www.wrap.org.uk/sites/files/wrap/valuing-our-clothes-the-cost-of-uk-fashion_WRAP.pdf) accessed 16 November 2021.

WRAP, 2019, *Consumer Research for ECAP 2016-2019 — evaluation and Insights Report, 2019* (http://www.ecap.eu.com/wp-content/uploads/2019/12/Consumer-Research-for-ECAP.pdf) accessed 16 November 2021.

Wright, C., 2017, 'Zero waste clothing — the next step in environmentally friendly fashion', Wake Up World (https://wakeup-world.com/2017/03/02/zero-waste-clothing-the-next-step-in-environmentally-friendly-fashion) accessed 16 November 2016.

Yuan, Q., & Shen, B., 2019, 'Renting fashion with strategic customers in the sharing economy', *International Journal of Production Economics* 218, pp. 185-195.

Zamani, B., et al., 2017, 'Life cycle assessment of clothing libraries: can collaborative consumption reduce the environmental impact of fast fashion?', *Journal of Cleaner Production* 162, pp. 1368-1375.

Annex 1
Overview of country waste prevention programmes

Countries	Title of programme (English translation)	Link to programme
Austria	Waste prevention included in the waste management law §9a Abfallwirtschaftsgesetz (Waste management law)	https://www.ris.bka.gv.at/Dokumente/LgblAuth/LGBLA_BU_20190201_7/LGBLA_BU_20190201_7.html
	Abfallvermeidungsprogramm 2017 (Waste prevention programme 2017)	https://www.bmlrt.gv.at/umwelt/abfall-ressourcen/abfallvermeidung/Abfallvermeidungsprogramm-2017.htm
Belgium	Koninklijk besluit betreffende de informatie die elke leverancier van een voorwerp moet doen toekomen aan het Europees Agentschap voor chemische stoffen Royal Decree on the information that every supplier of an object must submit to the European Chemicals Agency	http://www.ejustice.just.fgov.be/cgi/article_body.pl?language=nl&caller=summary&pub_date=20-06-02&numac=2020041331
	Plan de Gestion des Ressources et des Déchets (PGRD): Pour une consommation durable, sobre, locale et circulaire (Resource and waste management plan (RWMP): for sustainable, sober, local and circular consumption)	https://environnement.brussels/sites/default/files/user_files/pgrd_181122_fr.pdf
Belgium (Flanders)	Uitvoeringsplan huishoudelijk afval en gelijkaardig bedrijfsafval (Implementation plan for household waste and similar industrial waste)	https://www.ovam.be/sites/default/files/atoms/files/HA-uitvoeringsplan-VR-20161609-def-LR.pdf
Belgium (Wallonia)	Plan Wallon des Déchets-Ressources (Walloon waste resources plan)	http://environnement.wallonie.be/rapports/owd/pwd/PWDR_3.pdf
Bulgaria	НАЦИОНАЛЕН ПЛАН ЗА УПРАВЛЕНИЕ НА ОТПАДЪЦИТЕ 2021-2028 г. (National waste prevention programme)	https://www.moew.government.bg/bg/proekt-na-nacionalen-plan-za-upravlenie-na-otpaducite-2021-2028/
Croatia	IZMJENAMA ZAKONA O ODRŽIVOM GOSPODARENJU OTPADOM (Amendments to the law on sustainable waste management)	https://narodne-novine.nn.hr/clanci/sluzbeni/2019_10_98_1958.html
	IZMJENAMA I DOPUNAMA UREDBE O GOSPODARENJU KOMUNALNIM OTPADOM (Amendments to the regulation on municipal waste management)	https://narodne-novine.nn.hr/clanci/sluzbeni/2019_09_84_1721.html
	Odluka o donošenju Plana gospodarenja otpadom Republike Hrvatske za razdoblje 2017-2022 godine (Waste management plan of the Republic of Croatia for the period 2017-2022)	https://narodne-novine.nn.hr/clanci/sluzbeni/2017_01_3_120.html
Cyprus	Ethniko programma prolipsis dimiourgias apovliton 2021-2030 (National waste prevention programme 2021-2030)	http://www.opengov.gr/minenv/wp-content/uploads/downloads/2021/03/EPPDA_04-03-2021_-final-%CE%94%CE%99%CE%91%CE%92%CE%9F%CE%A5%CE%9B%CE%95%CE%A5%CE%A3%CE%97.pdf

Czechia	PROGRAM PŘEDCHÁZENÍ VZNIKU ODPADŮ ČR (Czechia's waste prevention programme)	https://www.mzp.cz/C1257458002F0DC7/cz/predchazeni_vzniku_odpadu_navrh/$FILE/OO-EN_WPP_Czech-20150407.pdf
Denmark	Danmark uden affald II — udkast til strategi for affaldsforebyggelse (Denmark without waste II — A waste prevention strategy)	https://mst.dk/media/130620/danmark_uden_affald_ii_web-endelig.pdf
Estonia	Riigi Jäätmekava 2014-2020 (National waste management plan)	https://www.envir.ee/sites/default/files/riigi_jaatmekava_2014-2020.pdf
Finland	Kierrätyksestä kiertotalouteen. Valtakunnallinen jätesuunnitelma vuoteen 2023 (From recycling to a circular economy national waste plan to 2023)	http://julkaisut.valtioneuvosto.fi/bitstream/handle/10024/160889/SY_01en_18_WEB.pdf?sequence=1&isAllowed=y
France	Law No 2020-105 of 10 February 2020 on combating waste and the circular economy Objectifs Stratégiques de festion et de prévention de la production de déchets (Strategic objectives for waste management and prevention)	https://www.legifrance.gouv.fr/eli/loi/2020/2/10/2020-105/jo/texte
Germany	Wertschätzen statt wegwerfen — Abfallvermeidungsprogramm des Bundes und der Länder. Fortschreibung (Valuing instead of discarding — Waste prevention programme by the federal government and the federal states. Update)	https://www.bmu.de/fileadmin/Daten_BMU/Download_PDF/Abfallwirtschaft/fortschreibung_abfallvermeidungsprogramm_bund_laender_bf.pdf
Greece	ΕΘΝΙΚΟ ΣΤΡΑΤΗΓΙΚΟ ΣΧΕΔΙΟ — ΠΡΟΛΗΨΗΣ ΔΗΜΙΟΥΡΓΙΑΣ ΑΠΟΒΛΗΤΩΝ (National waste prevention strategic plan)	N/A
Hungary	Országos Megelőzési Program (National prevention programme as part of the national waste management plan 2014-2020)	http://www.szelektivinfo.hu/iparfejlesztes/uj-uton-a-hazai-hulladekgazdalkodas/az-orszagos-hulladekgazdalkodasi-terv-es-az-orszagos-megelozesi-program
Iceland	Saman gegn sóun — Almenn stefna um úrgangsforvarnir 2016-2027 (United against waste — General policy on waste prevention 2016-2027)	https://www.stjornarradid.is/media/umhverfisraduneyti-media/media/pdf_skrar/saman-gegn-soun-2016_2027.pdf
Ireland	Towards a resource efficient Ireland — A national strategy to 2020 incorporating Ireland's national waste prevention programme (NWPP)	http://www.epa.ie/waste/nwpp/
Italy	Programma nazionale di prevenzione dei rifiut (National programme for waste prevention)	https://www.minambiente.it/sites/default/files/archivio/normativa/dm_07_10_2013_programma.pdf
Latvia	Noteikumi par atkritumu reģenerācijas un apglabāšanas veidiem (Regulations on types of waste recovery and disposal)	https://likumi.lv/doc.php?id=229378
	Atsevišķu veidu bīstamo atkritumu apsaimniekošanas kārtība un prasības titāna dioksīda ražošanas iekārtu radīto emisiju ierobežošanai, kontrolei un monitoringam (Procedures for the management of certain types of hazardous waste and requirements for the limitation, control and monitoring of emissions from titanium dioxide production installations)	https://likumi.lv/doc.php?id=232554
	Noteikumi par atkritumu klasifikatoru un īpašībām, kuras padara atkritumus bīstamus (Rules on waste classification and properties that make waste hazardous)	https://likumi.lv/doc.php?id=229148
	Atkritumu Apsaimniekošanas Valsts Plānu 2013-2020 gadam (Waste management plan for 2013-2020)	https://eur-lex.europa.eu/legal-content/LV/TXT/PDF/?uri=CELEX:72018L0851LVA_279303&from=EN

Lithuania	Valstybinė atliekų prevencijos programa (National waste prevention programme)	https://e-seimas.lrs.lt/portal/legalAct/lt/TAD/TAIS.458655
Luxembourg	Plan national de gestion des déchets et des ressources — PNGDR (National waste and resource plan)	https://environnement.public.lu/fr/offall-ressourcen/principes-gestion-dechets/Plan_national_de_gestion_des_dechets_PNGD.html
Malta	Long term waste management plan 2021-2030	https://environment.gov.mt/en/Documents/ministerialConsultations/longTermWasteManagementPlan2021-2030.pdf
Netherlands	Afvalpreventieprogramma Nederland (Waste prevention programme Netherlands)	https://www.rijksoverheid.nl/documenten/rapporten/2021/02/18/afvalpreventieprogramma-nederland
Norway	Fra avfall til ressurs (Waste management plan)	https://www.regjeringen.no/contentassets/27128ced39e74b0ba1213a09522de084/t-1531_web.pdf
Poland	Krajowy program zapobiegania powstawaniu odpadów (National waste prevention programme)	https://archiwum.mos.gov.pl/srodowisko/odpady/zapobieganie-powstawaniu-odpadow/
Portugal	Plano estrático para os resíduos urbanos (Strategic plan for urban waste)	http://apambiente.pt/_zdata/DESTAQUES/2014/RelatorioPropostaPERSU2020_Fev14_v2.pdf
Romania	Emergency Order No 74/2018 amending and supplementing Law No 211/2011 on waste, Law No 249/2015 on the management of packaging and packaging waste and Government Emergency Order No 196/2005 on the Environment Fund	
	Waste prevention programme is part of the national waste management plan. Planul National de Gestionare a Deșeurilor (National waste management plan)	https://lege5.ro/Gratuit/gi4dsmbxgqyq/ordonanta-de-urgenta-nr-74-2018-pentru-modificarea-si-completarea-legii-nr-211-2011-privind-regimul-deseurilor-a-legii-nr-249-2015-privind-modalitatea-de-gestionare-a-ambalajelor-si-a-deseurilor-de-am
Slovakia	Program predchádzania vzniku odpadu Slovenskej republiky na roky 2019-2025 (Waste prevention programme of the Slovak Republic for 2019-2025)	https://www.minzp.sk/files/sekcia-enviromentalneho-hodnotenia-riadenia/odpady-a-obaly/registre-a-zoznamy/ppvo-sr-19-25.pdf
Slovenia	Program ravnanja z odpadki in program preprečevanja odpadkov Republike Slovenije (Waste management programme and waste prevention programme of the Republic of Slovenia)	http://www.mop.gov.si/fileadmin/mop.gov.si/pageuploads/zakonodaja/varstvo_okolja/operativni_programi/op_odpadki.pdf
Spain	Programa estatal para la prevención de residuos 2014-2020 (State programme for waste prevention 2014-2020)	https://www.miteco.gob.es/es/calidad-y-evaluacion-ambiental/planes-y-estrategias/Programa%20de%20prevencion%20aprobado%20actualizado%20ANFABRA%2011%2002%202014_tcm30-192127.pdf
Sweden	Att göra mer med mindre: Nationell avfallsplan och avfallsförebyggande program 2018-2023 (Doing more with less: national waste plan and waste prevention programme 2018-2023)	http://naturvardsverket.se/Documents/publikationer6400/978-91-620-6857-8.pdf?pid=23951
Switzerland	Verordnung über die Vermeidung und die Entsorgung von Abfällen (Directive on the prevention and disposal of waste)	https://www.admin.ch/opc/de/classified-compilation/20141858/202004010000/814.600.pdf
Turkey	Ulusal atik yönetimi ve eylem plani 2023 (National waste management and action plan 2016-2023)	https://webdosya.csb.gov.tr/db/cygm/haberler/ulusal_at-k_yonet-m--eylem_plan--20180328154824.pdf

Annex 2
Good practice examples in European countries

A2.1 Austria

1 Austria's online repair guide

Target audience	Citizens, economy
Type of measure	Economic, voluntary, informative
Time period for implementation	Ongoing
Short description	The repair guide 'Austria's clever repair search' offers citizens the opportunity to quickly and reliably find online a repair option for a used product in the area (either with a suitable keyword or using the 12 different categories (e.g. clothing, electrical appliances, machines and household appliances.). The list of companies found can then be narrowed down geographically to individual districts. Every repair shop can register under certain requirements free of charge at www.reparaturführer.at. The online platform is supported by the partners in the respective federal states and supported by the Ministry for Climate Action (BMK) and Austria Glas Recycling GmbH (ARA).
	In addition, reference is made to the offer of a repair bonus. Federal states promote individual repairs at regional companies. These repair subsidies are not an offer from the repair guide, but were initiated and implemented directly by the federal states.

2 Establishment of a stakeholder initiative with a focus on textiles and clothing

Target audience	Administration, science, research and innovation, economy, non-governmental organisations (environmental and social)
Type of measure	Voluntary, informative
Time period for implementation	Ongoing
Short description	A stakeholder initiative with focus on textiles and clothing to exchange information/ experience and to promote circular economy and sustainable production was established. The first dialogue already took place on 15 October 2021.
	The aim of the first dialogue was to present current studies on textiles in the circular economy, to discuss the scope for action and measures for the Austrian circular economy strategy and to link up stakeholders along the entire value chain.
	Furthermore, there were very good experiences with previous stakeholder dialogues, which have been carried out by BMK (Ministry for Climate Action) for several years in the area of waste prevention (e.g. on food waste, reuse.)

3   *Development of an Austrian circular economy strategy with a focus on textiles and clothing*

Target audience	Administration, science, research and innovation, economy, non-governmental organisations (environmental and social)
Type of measure	Regulatory, economic, voluntary, informative, other
Time period for implementation	The Austrian circular economy strategy should be available in 2022.
Short description	With the Green Deal and the new action plan for the circular economy, the EU Commission is also focusing on textiles and clothing. It is planning to develop a comprehensive EU textile strategy with the aim of expanding the market for sustainable, environmentally friendly, reusable and repairable textiles in Europe. Based on these EU requirements, a circular economy strategy is also being developed in Austria, with a focus on textiles and clothing, among other things. The aim is to stimulate the transition to a sustainable, climate-neutral, competitive, resource-efficient, circular textile economy and society. Therefore, the Federal Ministry for Climate Protection has conducted a study on incentives for a sustainable and circular textile economy in Austria. The goal of this study is to obtain suggestions on how supply and demand for environmentally friendly, circular and durable textiles can be increased, sustainable production and behaviour patterns can be stimulated as well as a survey and estimation of the public procurement volume for textiles. The results of the study provide input for the development of the textile focus and show the procurement volume for textiles by public stakeholders in Austria, estimated at up to EUR 560 million annually. The goals of the transformation focus 'textiles and clothing' are: • extending the life and useful life of textiles; • promotion of circular business models; • increasing the collection, sorting and recycling of textiles.

A2.2   Bulgaria

1   *Separate collection of second-hand clothes and textile waste from households*

Target audience	Households, municipalities
Type of measure	Voluntary
Time period for implementation	Since 2016
Short description	Several different private companies engaged in the import, sorting and pre-treatment of second-hand clothes and textile waste operate the separate collection systems for textiles intended for households. These systems are on a voluntary basis after concluding contracts with municipalities. At present, the main municipalities in the country are covered, but there are no particular requirements and parameters of the systems. Separate collection is organised through traditional kerbside containers for textile. The collected second-hand clothes and textile wastes are sold on the Bulgarian or foreign market by the companies themselves. Some of the containers serve on behalf of the Bulgarian Red Cross (BRC). Of these, the second-hand clothes suitable for use are directed to the BRC crisis reserve or for donation to people in need.

A2.3 Croatia

1 Social Collective Humana Nova — Reuse of waste textiles

Target audience	Local community
Type of measure	Economic
Time period for implementation	1/5/2020-31/12/2020
Short description	The project aim was to collect and treat as much textile material as possible and repurpose it to make reusable textiles for industry in the form of industrial cloths with an indication of reuse. During the project 20.5 tonnes of textile were collected; 14 tonnes were reused for industrial clothes and the rest was shredded and given to the company REGENERACIJA d.o.o., Zabok, for the production of industrial felt.

2 Ecological Association 'KRKA' KNIN — The new attire

Target audience	Local community
Type of measure	Economic
Time period for implementation	1/3/2021-30/9/2021
Short description	Facing the great need for protective masks due to the COVID-19 pandemic, it was organised that textile material would be collected directly from households and through collection actions. The collected textiles were used to sew canvas bags and protective face masks, which were shared for free. During the project 1 tonne of textile was collected, out of which 1000 protective masks and 300 bags were made.

A2.4 Cyprus

1   Anakyklos Perivalontiki

Target audience	Cyprus residents
Type of measure	Voluntary/economic
Time period for implementation	Since 2014
Short description	Anakyklos Perivalontiki operates as a green and social enterprise/company, focusing on the collection and recycling of clothing, general fabric and fabric-related material. Though its primary goal is environmental sustainability through the recycling of clothes, fabrics, textiles, etc., it also has broader environmental and social aims. The company is funded from private savings and personal loans, undertaken by five volunteers, its initial members. The business employs 35 people in total, mainly from vulnerable groups (long-term unemployed). The revenues derives from:

1. the sale of second-hand clothes in its four charity shops located in Cyprus' four main districts; and

2. from the export of fabric and material to be resold or recycled and used as raw material abroad.

The project started initially with six collection banks/points in three municipalities and now there are 415 collection points, covering the whole of Cyprus through 30 municipalities and 125 communities, collecting so far over 6 000 tonnes of textiles.

As to its environmental actions, it has thus far led 126 activities for schools and 160 for the broader public.

As to the societal activities of the business (i.e. offering free-of-charge clothes/fabric-related material to the economically disadvantaged) these account for 2 335 people, in a population of 750 000, not counting home deliveries and institutions. Performs actions such as:

*   Sorting and offering free clothes to hundreds of people who need them, at the Anakyklos stores.

*   Collection of clothes from dozens of social organisations and offer thousands of euros to buy food for people in need, covering expenses and providing breakfast for poor students and/or to support the social work of the organisations.

*   Offering some quantities of clothes to Cyprus Red Cross.

A2.5 Czechia

1   Municipal reuse centres

Target audience	Public, citizens
Type of measure	Regulatory, economic
Time period for implementation	Since 01/01/2021 (unlimited)
Short description	Czechia supports the establishment of municipal reuse centres where citizens may bring things for reuse. Things for reuse may also include clothes, footwear and household textiles (e.g. Linens, blankets). Establishment of municipal reuse centres is supported through EU structural funds — Operational Programme Environment. Also from 1 January 2021, the new Act on Waste came into force, which specifically states that a movable thing, which a person handed over to a location designated by a municipality and which can be used for its original purpose, in accordance with other legal regulations, has not become waste, provided it has been handed over for reuse.

A2.6   Finland

1   Now, let's talk about textiles — Series of videos and blogs about textiles

Target audience	Citizens
Type of measure	Informative
Time period for implementation	Since 2018
Short description	The campaign, implemented during 2018, aimed to bring the broad theme of the textile circular economy to the attention of a wider audience. The aim was to promote a change in attitudes towards the consumption and recycling of textiles and to increase the value of textile products. The aim was to clarify for consumers the concept of waste textiles, recycling and the possibilities for further processing. The presentation of the stakeholders involved in the different stages of the textile cycle and the broad base of cooperation was also seen as a key message. The series was designed together between the Southwest Finland Waste Management, Turku University of Applied Sciences and Wallonia and was made as part of the Telaketju pilot project funded by the Ministry of the Environment. The name of the blog and video series was chosen to be 'Now let's talk about textiles!' It was decided to build the blogs around expert interviews. https://telaketju.turkuamk.fi/kuluttajaviestinta (in Finnish)

2   Economic support for reuse centres

Target audience	Reuse activity combining employment of long-term unemployed
Type of measure	Economic
Time period for implementation	Ongoing
Short description	Reuse centres can get economic support for their activities from municipalities. For example, wage subsidies are available to all who employ the long-term unemployed and reuse centres usually use this kind of labour. Regarding the rental costs, in some regions reuse centres can get rent subsidies from the municipalities. The economic support is not focused only on textiles but on all their activities covering all product groups they deal with.

3   Cooperation between key stakeholders: textile industry, research and government

Target audience	All
Type of measure	Voluntary
Time period for implementation	Ongoing
Short description	In Finland, in the past years there has been a growing amount of cooperation activities, research and development projects and initiatives and strategy building together with key stakeholders within textiles. For example there have been several large research and development organisations, such as https://finix.aalto.fi, https://telaketju.turkuamk.fi/en/front-page, building Rester Oy https://rester.fi/en and building a road map for carbon neutrality of textile industry in cooperation with the Finnish textile and fashion industry and the Ministry of Economic Affairs and Employment.

A2.7 Hungary

1 Swap of used clothing

Target audience	Employees of the Ministry of Agriculture
Type of measure	Voluntary
Time period for implementation	Since 2015
Short description	In order to keep in use the well-preserved but unnecessary items (clothing, shoes, household textiles, toys, etc.), we have been organising regular swaps for the employees of the Ministry of Agriculture since 2015. These events are very popular and more and more colleagues take part. After the swaps the remaining objects are always transferred to the Maltese Aid Service in Budapest. Since November 2015 16 swap events were held and 2 392 kg of items were brought in and found new hosts. We also arranged a 'sewing corner' at the ministry, equipped with an electronic sewing machine and threads, etc., to support colleagues in repairing their clothing, instead of buying new ones.

A2.8 Lithuania

1 Item sharing points (including textile) near bulky waste centres

Target audience	Residents of municipalities
Type of measure	Voluntary, social
Time period for implementation	From 2019 until now
Short description	Several regional waste management centres (RWMC) established sharing points near the bulky waste centres, where people can exchange suitable for use items (including textile). Vilnius RWMC established 16 sharing stations, Šiauliai RWMC established eight sharing stations (only home textile) and Utena RWMC established five sharing stations (only home textile). Other RWMCs are also planning on opening these sharing points in the near future.

2 Social business TEXTALE

Target audience	All residents
Type of measure	Voluntary, informative, social
Time period for implementation	From 2017 until now
Short description	Collection, sorting, preparation for reuse and sale of used textiles (clothing, footwear, accessories and home textiles). Repair and renovation services of clothing and other textiles, manufacture of secondary design products, social group integration projects and education of sustainable lifestyle and style, consulting research works for circular textile economy.

A2.9   Poland

1   *Repair shops at civic amenity sites*

Target audience	Every citizen
Type of measure	Regulatory, voluntary
Time period for implementation	N/A
Short description	Article 3 par. 2 point 6a of the Act on Maintaining Cleanliness and Order in Municipalities (OJ 2021 item 888) — every municipality can create repair/maintenance shops at civic amenities sites that must be created within easy access for every citizen. Information about these sites (address, working hours) must be presented online.
	These sites, in addition to be places for collecting waste, can be also educational centres featuring facilities to help the reuse of products (including textiles). There are various sources of financing (not only funds resulting from the fee paid by every property owner participating in municipal system of waste collection).
	More and more repair/maintenance shops are being created but the exact number is difficult to assess, as there is now no obligation to report this kind of place.

2   *Increasing awareness about importance of sustainable textile industry — Implemented by the Łukasiewicz Research Network — Textile Research Institute*

Target audience	Textile and furniture companies, designers, students and teachers representing the secondary schools — textile profile classes
Type of measure	Informative
Time period for implementation	Continuous implementation since September 2020
Short description	Organisation of trainings, workshops as well as presentations during conferences, events organised for the general public such as 'Textiles and climate change — You have an impact on the environment too!' during Innovation Night, resulting in the creation of eco-aware designers, producers and textiles consumers.
	The training sessions, presentations cover, among other things, covered the following issues:
	• data on the global textile and clothing sector (T&C) such as carbon footprint, resources consumption, including the fast fashion impact, hence the emphasis on the importance of textile waste prevention;
	• the emphasis on the role of future textile, apparel and clothing designers in the development of the sustainable textile industry (eco-design);
	• module on eco-design, including zero waste patterns, extending the life of the product by design, resale or rental, information on existing repair systems;
	• tips on how to become eco-aware consumer of textiles;
	• information on new business models such as rental systems.
	For example, young trained people were strongly impressed by the information on the size and manner of consumption of textiles and the impact of this phenomenon on increasing environmental pollution. Young people actively participated in creating new ideas for implementing the principles of sustainable textile industry.

3   Extension of textile products lifespan through the development of protective multifunctional products for rental use — Implemented by the Łukasiewicz Research Network — Textile Research Institute

Target audience	Workwear producers
Type of measure	Other, design and technology development
Time period for implementation	May 2019-October 2021
Short description	The development of the technology of a new generation of multi-functional protective clothing for application in the rental system. Such clothing is made of knitted fabrics having protective functions against selected factors of occupational environmental hazards. This clothing ensures the functional and quality durability when exposed to the strict conditions of industrial maintenance (washing). The option of renting and servicing protective clothing instead of purchasing it is a more economical solution, but is also environmentally friendly. Such activity is based on the circular economy model of the textile industry, where new clothes are put into circulation only when needed and their high quality is maintained from the very beginning to the end of each item's life cycle.

4   Reuse of cut edges from production of nonwovens — Implemented by the Łukasiewicz Research Network — Textile Research Institute

Target audience	Experimental production department of the institute
Type of measure	Voluntary
Time period for implementation	Implemented
Short description	The cut edges of needle-punched polyester non-woven material are fiberised immediately after cutting, and the recovered fibres are added to the original raw material.

A2.10 Sweden

1   Textilsmart

Target audience	Young people, women and residents of major urban areas
Type of measure	Informative
Time period for implementation	2018-March 2021

1   Textilsmart (Cont.)

Short description	In 2018, the Swedish Environmental Protection Agency was tasked to be responsible for conducting information efforts to increase the knowledge among consumers regarding sustainable consumption of textiles including topics such as increased reuse and recycling. The assignment should be carried out in cooperation with the Swedish Consumer Agency and the Swedish Chemicals Agency and the commission should include consumers' knowledge of the environmental and health impacts of textiles at every step of the value chain.

Initially, an analysis of the current situation was carried out with the aim of identifying consumers' knowledge of the environmental and health impact related to textiles and how consumers act today, how they want and can act to reduce their environmental impact from the consumption of textiles. It also aimed to monitor the impact of the efforts over time and to identify possible partners for cooperation.

In order to reach out broadly to selected target groups, the campaign's information initiatives were divided into four tracks:

1. low-intensity and long-term direct communication with consumers in their own digital channels, via advertising and intermediary providers of information in digital channels;

2. direct communication with consumers through targeted communication initiatives at selected areas, events and media initiatives ;

3. development of information material and cooperation with stakeholders like municipalities, county administrative boards and regions ;

4. collaboration with the industry to enable consumers to make more sustainable choices and to provide consumers with better information at the time of purchase.

A joint visual identity, communication plan and a campaign name were developed to give the three authorities a common voice. The information campaign was named Textilsmart. Two primary information channels were set up for direct communication and ongoing advertising to consumers: an Instagram account for concise, easily accessible facts and opportunities for dialogue, and a campaign site under Hallå konsument where consumers could find more detailed information. In addition, Textilsmart has implemented targeted communication initiatives and collaborations with stakeholders such as municipalities, county administrative boards and regions as well as with the industry to reach out and meet consumers in their everyday lives.

Three authorities have cooperated in the implementation of the information campaign Textilsmart. The campaign has also included collaborations with a variety of stakeholders to reach out widely to consumers in different arenas. A far-reaching cooperation has been carried out with the National F/ACT Movement project to promote more sustainable textile consumption. The collaboration between the Textilsmart campaign and the National F/ACT Movement has involved joint press releases, Instagram posts and that the participating of f/activists (individuals who during the project period received training and creative challenges in exchange for refraining from new consumption), shared Textilsmart's messages and materials and used #textilsmart in their own social media posts. The National F/ACT Movement includes seven nodes/municipalities responsible for: (1) disseminating information locally, (2) coordinating inspiring meetings for individuals/f/activists and (3) highlighting the local business community. The purpose was to stimulate collaborations and to test new solutions that contribute to a more sustainable textile consumption.

In November 2020, a follow-up consumer survey was conducted with 3 000 respondents, which means that the answers can be considered as statistically reliable. The survey shows that Textilsmart has had a good impact. Of the respondents, 11 % say that they have seen or heard about the Textilsmart campaign, and among younger people (17-29-year olds) 20 % have paid attention to the Textilsmart campaign.

1 Textilsmart (Cont.)

Short description	By February 2021, the campaign site had had about 114 000 visits. Textilsmart's Instagram account had over 9 500 followers. Textilsmart's hashtag (#textilsmart) had been used in around 3 500 posts. Textile smart's post on the Instagram account (2019-2020) have been viewed by Instagram users more than 3.25 million times, with an average engagement rate of 5.5 %. The impact of Textilsmart's message through forwarders has been estimated at a maximum reach of up to 3.3 million views. The advertising has resulted in more than 23.5 million exposures of Textilsmart's messages on Instagram, Facebook and YouTube. As of January 2021, Textilsmart's Collaboration Project F/ACT Movement had nearly 6 000 followers on Instagram. The project's 63 f/activists and seven nodes/municipalities together had about 72 000 followers, all of whom had taken part in posts and events tagged with Textilsmart's hashtag (#textilsmart).

2 Re:textile

Target audience	Stakeholders of the textile industry
Type of measure	
Time period for implementation	2018-2019
Short description	In 2018, the Swedish Environmental Protection Agency granted the project Re:textile, at the University of Borås, Science Park Borås a grant of SEK 3 000 000 to contribute to the development of sustainable business models in the textile and fashion industry. The development of more sustainable consumption and production needs to run in parallel and so that a change in both supply and demand (through information to consumers on more sustainable consumption) takes place in harmony with each other. The purpose of Re:textile III (2018-2019) was to scale up the project to the national level in order to contribute even more to reducing resource consumption and creating opportunities for a more environmentally sustainable textile value chain, enabling new business models while demonstrating economic viability in the models and, in the long run, facilitating consumers to choose more sustainable alternatives. Re:textile conveys knowledge, advice and practical application in collaboration with companies in the fashion and textile industry. The aim of the project was to help the industry with transition by creating good examples to inspire, conduct economic studies on scalability and profitability in circular business models. By including the consumer perspective in the pilot study of the F/ACT Movement initiative, Re:textile III has worked with an even broader system perspective to influence the textile and fashion industry to a circular transformation and more sustainable development. In 2020, Re:textile was granted an additional grant of SEK 450 000 to package its results in a way that the industry can take them off in an even more easily accessible way than before.

3 The Textile Dialogue

Target audience	The entire textile value chain (stakeholders as well as non-governmental organisations, authorities, researchers, etc.)
Type of measure	A series of dialogue meetings
Time period for implementation	2017-2020 and at the beginning of 2021 the Textile dialogue was included as one of the actions within the Swedish roadmap for circular economy.
Short description	The Swedish Environmental Protection Agency and the Swedish Chemicals Agency jointly run dialogue meetings for a sustainable textile value chain with a focus on the environment and chemicals.
	The purpose of the Textile Dialogue is to reduce the environmental and health impact throughout the textile value chain from production and consumption to waste management and contribute to resource-efficient and non-toxic cycles. Tools, methods and good examples for sustainable textile production and consumption — with a focus on the environment and chemicals.
	Through dialogue and co-creation as a method, the Swedish Environmental Protection Agency and the Swedish Chemicals Agency want to involve stakeholders to create action around relevant issues in the textile value chain. The dialogue takes place in cooperation with a broad group of stakeholders in the textile sector such as trade associations, innovation and education stakeholders, researchers, non-governmental organisations and secondary stakeholders, municipal representatives, ministries and authorities.
	At the dialogue meetings, participants discuss methods that reduce environmental impact and chemical use, tools, innovative solutions, means to apply for development work and ongoing research. There is also the possibility of exchange of experience, networking and inspiration for innovative solutions.

4   Textile & Fashion 2030 — The National platform for sustainable textile and fashion industry

Target audience	Textile industry and other actors involved in the textile value chain
Type of measure	Informative and practical guidance
Time period for implementation	2018-2022
Short description	A united Sweden for a sustainable textile and fashion industry It is URGENT that the fashion and textile industry becomes environmentally sustainable and eventually develops a climate-neutral and non-toxic cycle in line with what the planet can sustain. Textile & Fashion 2030 is a neutral arena and enables new, sustainable solutions and business opportunities for the textile and fashion industry. We unite industry players and create a dynamic, strong COMMUNITY to reduce environmental impact at both national and international levels. Textile & Fashion 2030 is the platform that puts Sweden at the forefront when it comes to the development of the textile and fashion sector in moving towards sustainability and a circular economy. Its aims are: • to promote collaboration, cooperation and efforts towards an environmentally sustainable value chain in the textiles sector; • to make research and development results available for environmentally sustainable development and provide a bridge between research and practice; • to promote sustainable business models and combine environmental benefits with business benefits; • to strengthen the work of SMEs to achieve circular flow and environmentally sustainable development; • to minimise negative environmental effects from production. In this way, the platform also works to achieve the national environmental goals and the Agenda 2030 goals that affect textiles and fashion. The platform, in collaboration with relevant stakeholders from business, academia, institutes and public organisations, will encourage and coordinate education, research and innovation with the aim of supporting environmentally sustainable development. Areas of focus include developing new business models, freeing production and other activities from substances harmful to health and the environment, improving energy efficiency in the sector and, primarily, promoting a transition to a circular economy, i.e. models that result in an efficient cycle of materials rather than linear processes. The purpose is to create a circular cycle for the textile and fashion sector. **Goal** Textile & Fashion 2030 will situate Sweden as a world-leading partner and role model in the circular economy with minimal environmental impact in terms of textiles and fashion. Within Textile & Fashion 2030, we intend to strengthen the positive forces already at work and together ensure that the Swedish textile and fashion industry's contributions to meeting the global goals of Agenda 2030 are realised. **Vision** The platform for sustainable fashion and sustainable textiles is an effective resource for companies' transition to a circular economy and, for the sector, a centre when it comes to knowledge and collaboration, thus making Sweden a leader in relation to the environment and sustainability. There are a number of strategic target areas with measurable, related operational goals linked to the platform's structure and activities that protect the platform's vision. We offer skills development, activities and tools that measure the progress of your sustainability work to achieve desirable results and to meet the consumer of the future. Through our work, Sweden is ACTING now and we are acting together.

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