Durable, repairable and mainstream

How ecodesign can make our textiles circular

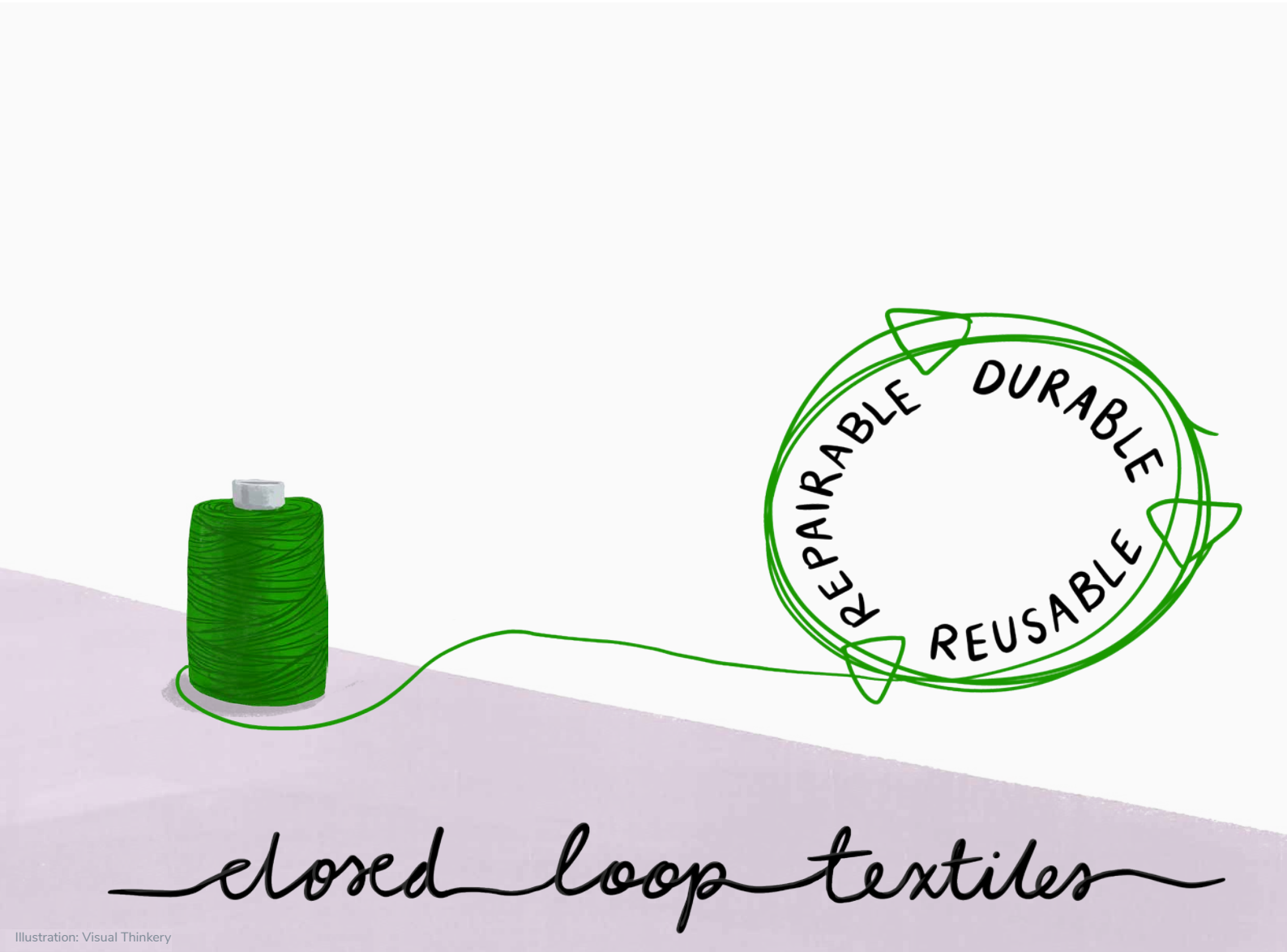

Illustration: Visual Thinkery

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ecos

About ECOS

ECOS - Environmental Coalition on Standards is an international NGO with a network of members and experts advocating for environmentally friendly technical standards, policies and laws. We ensure the environmental voice is heard when they are developed and drive change by providing expertise to policymakers and industry players, leading to the implementation of strong environmental principles.

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Executive summary

Textile products have a tremendous ecological footprint at all stages of their lives. As more clothes are produced, consumed, and thrown away than ever before, the current linear, take-make-dispose model followed by the textile industry is putting an enormous pressure on our planet – its resources, environment and climate.

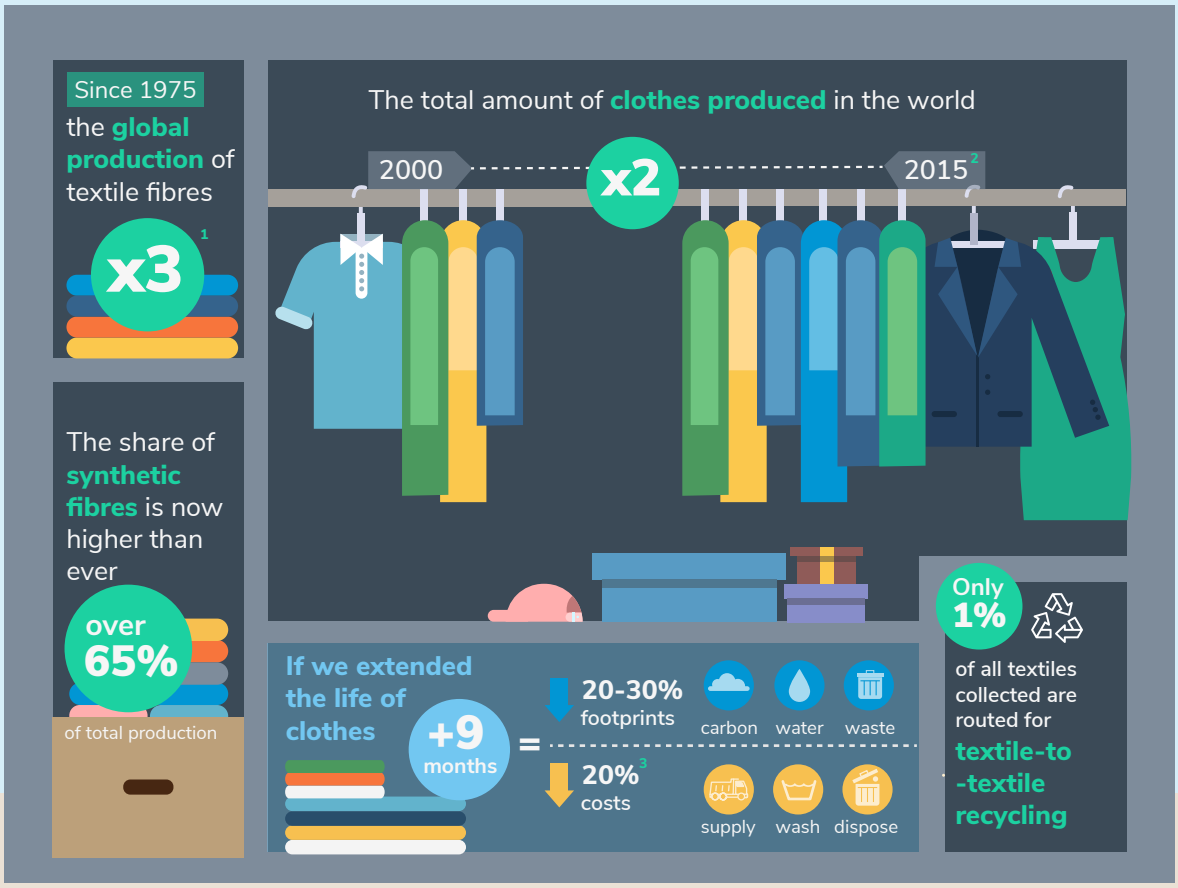


Figure 1 Textiles in numbers

In spite of its shocking impact, the sector has been largely untouched by EU environmental policies to date. However, the tide seems to be turning: at the end of 2019, the European Commission finally noticed the potential of circular models in the textile sector[4]. An EU Strategy for Sustainable Textiles under the Circular Economy Action Plan was identified as a priority of the Commission's European Green Deal[5], alongside a Sustainable Products Policy, and a 'zero-pollution' ambition for a toxic-free environment.

This report provides a comprehensive analysis of the current situation and goes on to explore the policies and standardisation actions needed to advance towards circular textiles, building on the lessons learnt from the implementation of the ecodesign approach in other sectors.

In particular, we argue that textile products put on the EU market should comply with a minimum level of sustainability. Mandatory ecodesign requirements for textiles and textile products are needed to address minimum lifetime, as well as durability, reusability, repairability, recyclability, prevent the presence of hazardous chemicals, and limit microplastics release at all stages. They should also help improve the information communicated across the value chain.

Designing better is key: up to 80% of product environmental impacts are determined at the design stage. We urge the European Commission to apply the principles of ecodesign to textile products, following the model of electricals and electronics, regulated through the existing Ecodesign Directive[6]. Legislation can and should stimulate sustainable design for durability, reusability, repairability and recyclability in textiles too.

80%
at design stage

For the implementation of circular economy principles in textiles, this policy framework should also be supported by ambitious standards, many of which still need to be developed. They are particularly needed to enable the assessment of performance and materiality aspects of textiles, and to set reliable metrics and evaluation tests to facilitate reuse, repair and recycling of textile products. Standards should also harmonise the principles for services and processes of circular business models to support the sharing and collaborative economy and the product-as-service model.

Applied to the textiles industry, ecodesign principles would oblige producers to consider their environmental impacts every step of the way, rather than leaving society to foot the bill. We strongly believe that minimum requirements are essential to begin the transformation of the textile sector towards circularity.

Policymakers have the opportunity to make sustainable textiles the norm. The following set of recommendations shows how this can be one:

Design products and systems for longer lifetimes

Set minimum durability requirements for all textiles, including a desired lifespan for products. Consumers should be informed about the expected lifetime of a product in a standardised way.

Make products reusable, repairable and recyclable

Set clear, ambitious and mandatory targets for reuse and preparation for reuse, and ensure that essential parts of products are easily replaceable, repairable and upgradable. Textiles must be intentionally designed for material recovery, value retention, and meaningful next use. In addition, it is vital to limit the types of combination of different materials, material mix, chemicals, dyes and finishes that are not compatible with recycling.

Focus on toxic-free, circular products and materials

Restrict and substitute chemicals of concern and ensure transparency regarding the chemicals present in textile products and in the production phase. Ensure the absence of substances of very high concern (SVHC) from textile products through ecodesign. Make REACH Regulation circularity-friendly and address textiles specificities, prioritising substitution efforts and driving the elimination of hazardous chemicals. Introduce mandatory requirements to reduce the use of hazardous chemicals, as well as to trace and disclose information regarding their use.

Limit microplastics release from textiles

Set maximum levels of microplastic release allowed during production, use phase, and end-of-life and set minimum biodegradability requirements for microfibres.

Promote raw materials that are sustainably and ethically sourced

Promote sustainably and ethically sourced materials, provided it goes hand-in-hand with overall reduction of virgin resource use and the introduction of an ambitious mandatory due diligence legislation that ensures the full lifecycle of textiles is covered.

Introduce Extended Producer Responsibility schemes for textiles

Set up an EPR scheme for textiles that respects and implements the EU waste hierarchy, promoting durability, reuse and repair first and not only focusing on the end-of-life stage, with a clear, transparent and democratic governance. Implement a mandatory ban on the destruction of textile products to send a strong signal to production and logistics, openly addressing overproduction.

Introduce a product passport to ensure traceability and transparency

Insufficient information still remains a bottleneck for sustainability and circularity in the textile sector. Digital product passports need to include a bill of materials and chemicals, environmental information, details on repairability, durability, and due diligence (social and environmental), essential information regarding product circularity and links to valuable external data sources.

Towards circular textiles:
a recipe to slow down and close the loop

Textile production is a linear, resource intensive industry. Its impacts on the environment are significant and wide-ranging: hazardous chemicals, unsustainable use of natural resources (land, water, energy), vast amounts of greenhouse gas emissions, waste and microplastics pollution. To top it off, production is often outsourced to developing regions, and is subject to poor and dangerous working conditions, as well as environmental degradation and forced and child labour[7].

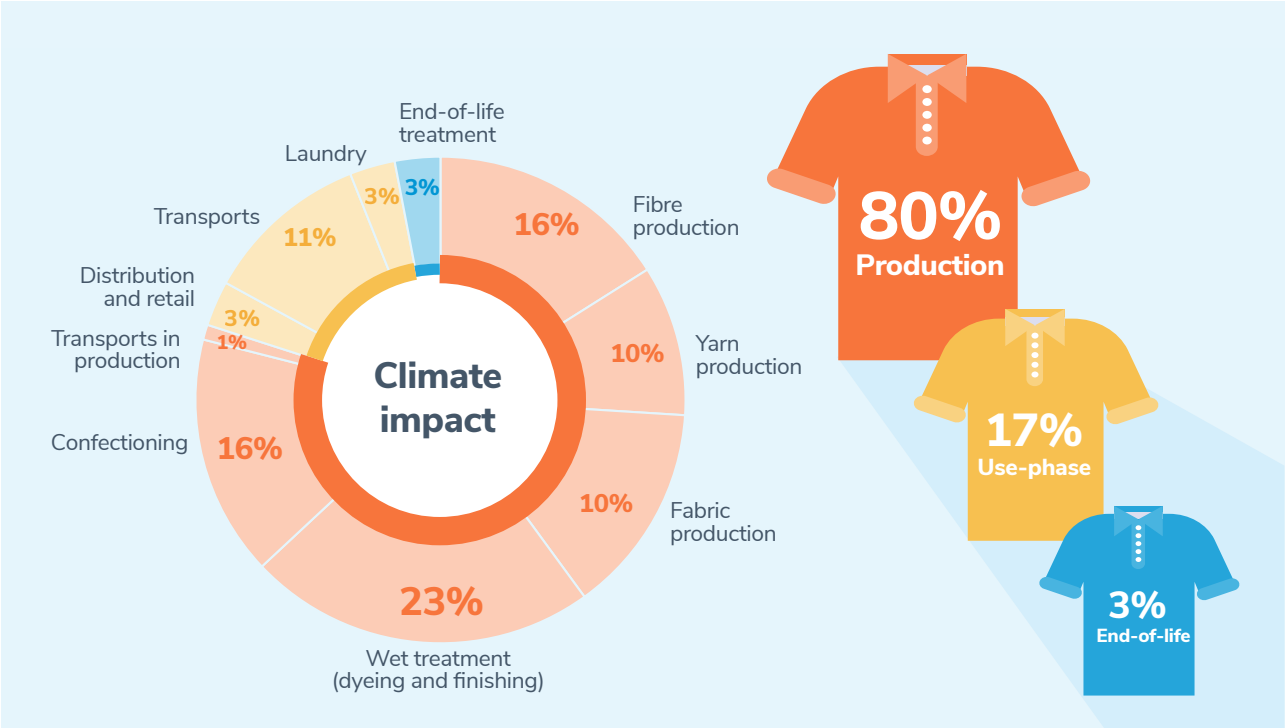


Figure 2 Climate impact of Swedish clothing consumption[8]
Source: Mistra dialogues, Investor Brief: Sustainability in Textiles and Fashion, 2020

Today's fashion is faster and faster – and keeps on accelerating at breakneck speed. In 2017, EU households spent €527.9 billion on clothes and textile products[9]. According to EEA estimates[10], the amount of clothes bought per person in the EU increased by 40% between 1996 and 2011, with an average European consuming 26 kg of textiles per year[11].

Clothing represents the lion's share of the industry, but there is more to it – for example, technical and household textiles such as floor coverings, linen, bedding and cleaning textiles[12].

As textile consumption increases, so does its environmental impact. To tackle this problem, it is essential to:

- **Slow down the loop.** We need to reduce resource use and prolong the useful life of textiles. Designs must enable clothes to last longer, prioritising life-extending measures such as durability, ease of reuse, repair and remanufacturing;

- **Close the loop.** We need to enable the reutilisation and recycling of materials[13], keeping in mind that the waste hierarchy should be applied at all times, and favouring value retention through prolonged use over material recycling.

Another issue worth mentioning is that the textile industry is driven by fossil fuels, with synthetic fibres produced from finite resources such as crude oil, accounting for two-thirds of the material input for textiles production today. In the first fifteen years of this century global clothing production doubled, as did the use of synthetic fibres. We need to extend the lifetime of products on the one hand, and, on the other, promote the use of materials that are sustainably and ethically sourced, produced with a lower carbon footprint and using renewable energy sources.

Studies show that increasing the lifetime of garments would be the most powerful way to capture their value, reduce pressure on resources and decrease negative impacts[7]. In this section, we will first look at the environmental benefits of material efficiency, and then discuss how policies and standards can help reap these environmental savings.

Why we cannot recycle our way out of the textile problem

Our incapacity to deal with textile waste is rather apparent. Less than 1% of textiles worldwide are recycled into new textiles. In fact, textile recycling is mostly "downcycling": recycling a material into a lower value product, such as filling for furniture, panel lining, loudspeaker cones, insulation for buildings or rags.

Two main recycling options for textiles currently exist: mechanical and chemical recycling. The latter has enormous energy and greenhouse gas emission impacts. These options are hardly ever used.

The textile-to-textile recycling process is hindered by the widespread use of mixed fibres, dyes and other finishes that are not compatible with recycling, as well as by the technical challenges often posed by the low quality of recycled fibres, unsuitable to be recirculated multiple times. For example, in the case of elastane, a common addition in our clothing, virtually no recycling methods are available at present. As a result, elastane acts as a 'contaminant' in clothes that otherwise could be recycled.

Environmental benefits of material efficiency – use for longer, protect the planet

A great number of environmental benefits could be brought about by applying material efficiency aspects to textiles.

Firstly, it is evident that an increase in textile durability allows for longer use and reuse of products. As British non-profit experts from WRAP put it, designing more durable textile products is our 'single largest opportunity' to reduce environmental impacts related to greenhouse gas (GHG) emissions, water demand and waste generation of textiles[14].

Furthermore, research performed by WRAP indicates that:

- extending the life of clothes by nine extra months can reduce carbon, water and waste footprints by 20 to 30%;
- reducing new garment production by 5% through increased duration of first use, reuse, and repair would deliver environmental benefits equivalent to 20 tonnes of GHG emissions;
- if the number of times a garment is worn were doubled, GHG emissions would decrease by approximately 44%, as compared to the production of a new garment.

Figure 3 Rule of thumb: Design & use clothes for longer

Scenario	Carbon savings	Water saving	Waste savings	Savings in resource costs
10% longer lifetime (i.e. 3 months)	8% (3 Mt CO_2e)	10% (600 million m^3)	9% (150,000 tonnes)	9%
33% longer lifetime (i.e. 9 months)	27% (10Mt CO_2e)	33% (2,000 million m^3)	22% (400,000 tonnes)	22%

Table 1 Using clothes for longer time could potentially reduce our footprint and prompt savings in resource costs. Source: WRAP[18]

In addition, increased material efficiency will help reduce the volume of textile waste and its landfilling[19].

Overall, more durable products with longer lifetimes are generally associated with higher environmental benefits than recycling[20].

The time is now for policies and standards for circular textiles

EU policies are transforming the way products are designed

As a part of the European Green Deal, the 2020 Circular Economy Action Plan presented textiles as a priority to be tackled. It aimed for a sustainable and circular textile industry, by 'developing ecodesign measures to ensure that textile products are fit for circularity' and 'boosting the sorting, reuse and recycling of textiles through innovation, encouraging industrial applications and regulatory methods' [21]. In the same document, the Commission states, in more general terms, that 'in a circular economy, products (...) have a long lifetime, due to a durable design. In case a product breaks, it is repaired. When a consumer no longer needs a product, it is passed on and reused by another consumer, or products are shared from the outset'.

While certain EU policies[22] do already target the textile industry and various EU labels exist, they fail to take a holistic approach to the sector's sustainability and only sporadically cover its impacts. For sustainable products to become the norm in the EU, the primary focus of the regulator must be on removing unnecessary, inefficient, toxic, wasteful and polluting products from the EU market, complemented with (and not driven by) better consumer information[23].

Setting mandatory minimum ecodesign requirements for products has proven to be extremely successful for energy-related products, regulated under the Ecodesign and Energy Labelling framework. Here, a combination of push and pull mechanisms provides the right incentives to drive the worst performers off the market while rewarding the most efficient products, ultimately transforming the whole industry. This is a telling example of how minimum ecodesign requirements can be accompanied by robust requirements to improve consumer information. With this set of policies, the European Union has succeeded in transforming the way a number of product groups are designed, resulting in tremendous energy savings, making products longer lasting, easier to repair and recycle, and removing some hazardous substances[24].

Ecodesign principles could be transposed to other sectors too, and help reduce the environmental impact of, among others, textiles. Introducing mandatory minimum requirements is essential to increase the durability, repairability and recyclability of products. Requirements can drive a successful shift towards a circular textile economy, provided that they are supported by strong enforcement and adequate market surveillance.

In addition, **mandatory standardised labelling and claims** on sustainable and circular textiles should be introduced to ensure environmental claims are relevant, transparent and reliable to avoid 'greenwashing' and react to the current proliferation of unfounded claims.

Finally, the textile sector could also fight for its own **'right to repair'**. While in the case of textiles repair is strongly linked to the actual skills needed to perform it (mending, sewing, etc.), repairing and reusing are crucial notions if textiles are to become circular.

European and international standards - a push towards circularity?

The textile value chain is global, and so are the technical standards that often become the international language used within the supply chain. Even though decades of voluntary self-regulation have not been effective in switching to a circular model, standards have the potential to provide tools for the textile industry to embrace circular economy principles – provided they come to support an ambitious policy framework. Standards can encourage circular design, preparing for durability, reuse, repair and facilitating recyclability at end of life, in line with a broader reduction of the impact products have on the environment.

Although standards have a role to play in support of the upcoming regulatory requirements, they are currently inadequate or altogether non-existent on key issues that could significantly contribute to the sustainability and circularity of the textile value chain.

New standards are particularly needed to enable the assessment of performance and materiality aspects of textiles, as well as to set reliable metrics and evaluation tests to facilitate reuse, repair and recycling of textile products[25]. There is a great need to define what 'circular' means for the sector, and to develop and harmonise circular metrics. The latter should enable the assessment of direct impacts, such as durability, extended life cycle, material consumption and reduced waste generation, as well as facilitating the integration of indirect impacts, notably climate change, resource depletion and eco-toxicity. Standards should also harmonise the principles for services and processes of circular business models in order to support the sharing and collaborative economy and the product-as-service model.

It is our view that standards should provide important tools to support the implementation of circular economy principles in textiles[26]. Standardisers in ISO and CEN should urgently establish:

- relevant definitions, notably of sustainable and circular textiles;
- design principles for durability, repairability, lifetime optimisation;
- assessment and measurement methods, for example to assess durability, reusability, repairability and recyclability, determine the amount of recycled content, quantify the shedding of microplastics and biodegradability requirements for microfibres.

In Annex I, we provide a detailed list of standardisation must-haves in order to move towards more circular textiles.

Standards are still long way away from effectively supporting a circular textile sector. But it is worth mentioning that, while insufficient, some initial ground has already been covered. A number of policies highlighted in this report (such as possible material efficiency requirements) could be enforced with the use of already available general standards and test methods. This is the case of standards such as determination of dimensional change in washing and drying (ISO 5077), the EN-ISO 13934 series on tensile properties of fabrics, the determination of fabric propensity to surface fuzzing and to pilling (EN-ISO 12945), determination of the abrasion resistance of fabrics (EN-ISO 12947), and test for colour fastness (EN-ISO 105).

Current initiatives won't cut it: an analysis of existing textiles labels and certifications

Design for reusability, repairability and recyclability could be introduced at policy level, starting by defining the concepts, identifying the existing barriers ahead, as well as the missing pieces of the puzzle.

Systematically **addressing material efficiency in the design of textile products** is crucial if the sector is to move away from the linear business model of the textile industry.

Design for durability, both physical and emotional, may increase the lifespan of textiles, therefore reducing textile waste and the overall use of virgin material and chemical substances.

At the same time, introducing design for reusability, repairability and recyclability on a policy level is an opportunity to transform an entire industry into a circular business model.

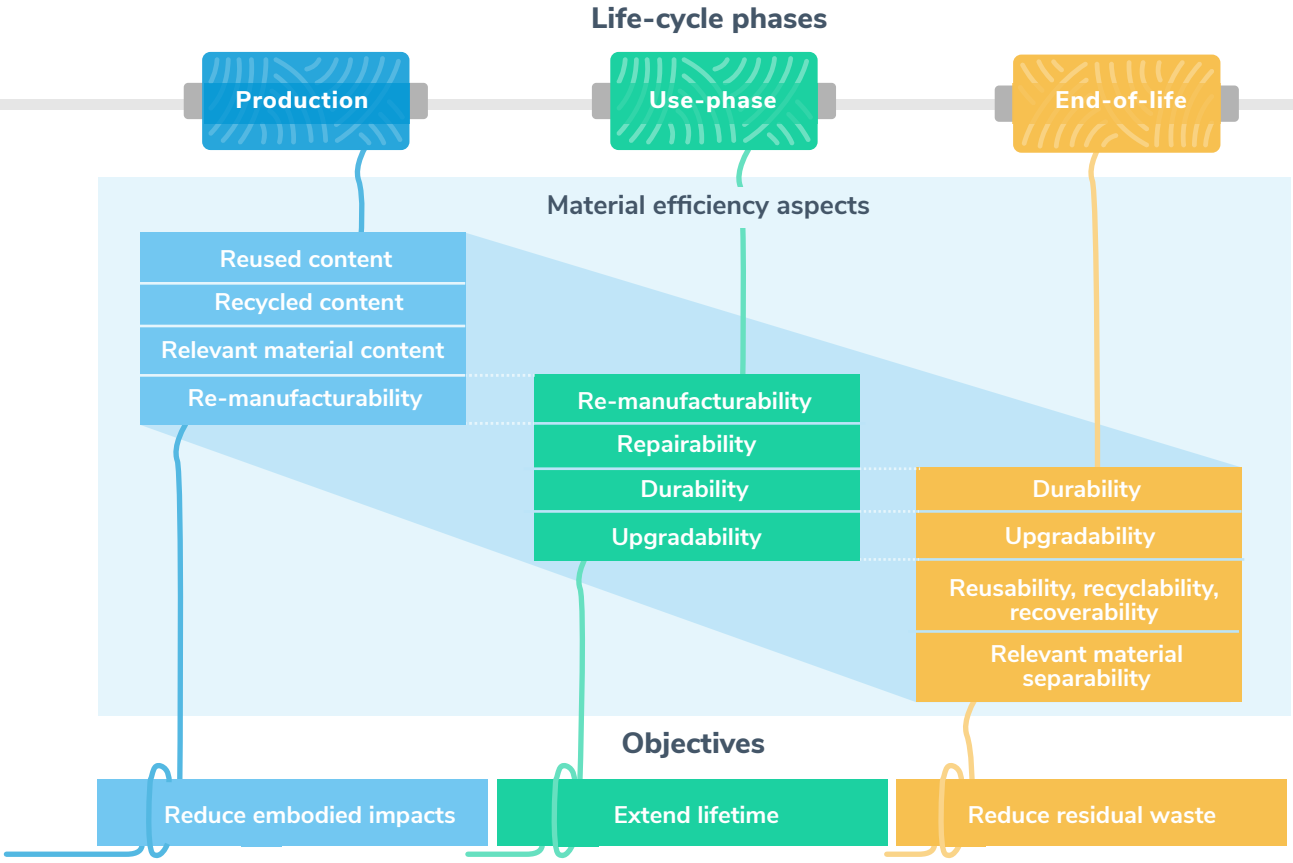


Figure 4 Material efficiency aspects

Durability, reusability, repairability and recyclability – definitions and challenges

As a first step, it is important to establish common definitions of durability, reusability, repairability and recyclability, as well as pinpoint the challenges preventing truly circular textiles from becoming a reality.

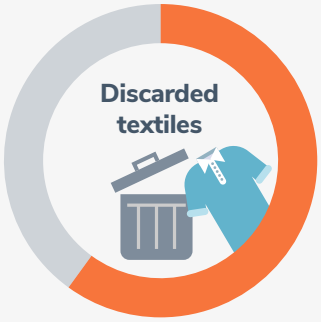
Durability

A durable product lasts a long time without significant deterioration and requiring minimum maintenance, retaining the garment's original function and properties. Durability is often linked to characteristics such as oil repellence and waterproof qualities but, in this report, 'durability' covers the general aim to increase the quality of textiles used, and their reuse and repair potential.

It is important to make a distinction between 'product lifespan extension' as an outcome of the quality of a product based on functional durability, which is the focus of this report, and the use consumers make of the product, which may consequently affect the product lifespan[27].

Durability depends on the design, production and manufacturing choices, as well as the use phase. Those affect all stages of a product's life. The focus on low-cost and trend-driven fashion, and the absence of minimum quality requirements, can lead to the lowering of quality for materials, higher disposal of 'out of fashion' garments and faster production cycles[28]. Durability is largely influenced by design choices in the production processes, such as the choice of fibres, their dimensions, thickness and length, yarn number, twist and density, fabric binding, the assembling with regards to applied weaving and seaming techniques, as well as finishing processes of colouring, printing or application of fasteners and accessories (and their quality).

These dynamics, in turn, incentivise the industry to adapt their business models, which no longer focus on product quality and durability but rather on the 'buy more, use less, throw away' model. The textile industry imperatively needs to address the low level of 'emotional durability' of textile products, which often contributes to the decision to discard them after a short time. Design for durability thus needs to account for 'emotional durability', considering a product's ability to be desirable long-term[29].



60%
disposed of due to lack of quality

Literature suggests that approximately 60%[30] of discarded textiles are disposed of due to lack of quality or failures in the garment itself (e.g. pillage, colour fastness properties, tear strength, dimension stability, zipper quality, etc.)[31].

Reusability

Reusability depends on the existence of durable textiles on the market. Reuse becomes very unlikely if garments are not made to last longer, and certain weak points exist (such as seams, fasteners or accessories). In addition, reusing textiles requires a business model which effectively redistributes the products.

The percentage of clothes that enter the reuse phase is very limited. Current research shows that around 15-20% of textiles are collected for recycling or reuse in Europe, whereas 75-80% are either landfilled or incinerated. Of the collected textiles, an even share of 50% each for reuse and recycling is observed[32]. In addition, current trends (i.e. fast fashion at low prices) prevent an increasing demand for reused textiles[33].

Repairability

Repairability depends on design and how durable the product is conceived to be. If the garment itself is not designed to be durable, it is unlikely to be considered for repair.

Furthermore, it is influenced by the design for replacement of certain parts, such as, for instance, fasteners. While spare parts (fasteners, accessories etc.) might be available, there is no system in place allowing consumers to access them easily, nor do producers take responsibility for the repair of textiles. Current fashion trends do not design for repair, even though certain weak points could be easily addressed: for example, an enhanced ease of disassembly, in other words, the ability to access or remove certain components from products to facilitate repair, remanufacture or reuse. Wear, tear, stains and technical failures account for 50-60% of discards, aside from subjective causes for discarding clothes such as boredom, change of size, etc[34].

These circumstances exist due to the lack of policy requirements relating to product stewardship as well as those relating to design for repairability, which contradicts the predominant business model of the industry.

Recyclability

Recyclability is determined by the existence of relevant recycling technologies for garments. It is greatly influenced by fibre-mix, chemical compounds and the collection of textiles for recycling itself[35]. The quality of recycling technologies can in fact pave the way for reuse within the textile cycle, and enable more than just downcycling.

Recyclability is often inhibited by the use of chemicals and complex fibre mixtures[36]. Limitations also come from technologies, fibre composition and means of textile collection and sorting. Furthermore, introducing recycled fibres could be more costly than using primary materials[37]. Current trends in fashion produce large amounts of textile waste overall, but also make the waste quality very poor, thus preventing the recycling processes from achieving the desired quality or the extraction of desired content.

Existing minimum requirements ‘forget’ reuse and repair

For the purpose of this report, ECOS asked the consulting company Ramboll to examine the existing legislative, policy, standards and other instruments covering the design of textile products, and analyse how they cover material efficiency, using the four parameters previously defined.

More specifically, we looked into the following schemes to identify minimum criteria for materiality aspects already in place:

- **labels**, namely the EU Ecolabel, Nordic Swan, Blue Angel, Green Button;
- **certifications schemes**, such as the Global Organic Textile Standard, Textile Exchange, Cradle-to-Cradle, OEKO-TEX, etc;
- a number of **initiatives**, notably the ones from WRAP which look at Design for Longevity and their Clothing Longevity Protocol, as well as the Jeans Redesign Guidelines;
- **additional literature** provided useful insights on the topic from the European Commission Joint Research Center, the Nordic Council of Ministers, Interreg North-West Europe Fibersort and the Ellen MacArthur Foundation.

The analysis showed that these instruments focus on durability (50% of instruments) and recyclability (45% of instruments), whereas reusability (25% of instruments) and repairability (20% of instruments) are not addressed as profoundly, as presented in Table 2.

Name of instrument	Coverage of material efficiency aspects			
	Durability	Reusability	Repairability	Recyclability
EU Ecolabel	✓	✗	✗	✗
Nordic Swan	✓	✗	✗	✗
Textile Exchange – Global Recycled Standard	✗	✗	✗	✗
Textile Exchange – Recycling Claims Standard	✗	✗	✗	✗
Blue Angel	✓	✗	✗	✗
WRAP Sustainable Clothing Action Plan – Design for Longevity	✓	✓	✓	✓
WRAP – Clothing Longevity Protocol	✓	✗	✗	✗
Nordic Council of Ministers – Potential Ecodesign Requirements for Textile and Furniture	✓	✓	✓	✓
Interreg North-West Europe Fibersort – Policy recommendations towards a zero waste textiles industry	✓	✓	✗	✓
Global Organic Textile Standard v6.0	✗	✗	✗	✓
JRC – Environmental improvement potential of textiles	✗	✗	✗	✓
Ellen MacArthur Foundation – A new textiles economy: Redesigning fashion's future	✓	✓	✗	✓
Cradle-to-Cradle	✗	✗	✗	✓
OEKO-TEX Made in Green	✗	✗	✗	✗
Green Button	✗	✗	✗	✗
The Jeans Redesign Guidelines	✓	✗	✗	✓

Table 2 Coverage of material efficiency aspects per instrument applied to textile products

The lack of focus on reusability and repairability could be explained by the strong overlaps: if a garment is more durable and can be used for longer, it is also more likely to be reused. There are also overlaps between repairability and recyclability, for example in the form of design for replacement and disassembly.

Furthermore, it is interesting to note that there is no estimation of the desired lifespan of products in absolute terms, which represents an important pre-condition for a realistic and target-based identification of minimum requirements. Durability criteria cover, for example, tensile strength of fibres, durability of fasteners, colours, shape, resistance to pilling, resistance to dry/wet rubbing, resistance to pilling, form retention, seams break, fasteners fail, fabric stained, colour change and staining[38], and chemical content. On minimum recycled content, the EU Ecolabel includes some quantitative information: for textile products, staple fibres should contain at least 50% recycled PET, and this requirement is coupled with the assessment and verification of the recycled content through a third-party certification.

Going one step further, we also asked Ramboll to carry out a comparative assessment of the different tools and score them on the strengths of the material efficiency requirements, selecting the most innovative ones as described in Table 3. In order to do so, a number of aspects were considered, including whether the instruments mentioned material efficiency as objectives, without requirements; whether they included qualitative criteria and recommendations; or, finally, whether they provided quantitative indicators or thresholds.

The results of the comparative assessment are displayed in Table 3 below. A number of instruments score very high on certain aspects (i.e. the ecolabels and the Cradle to Cradle® certification) but only cover part of the picture. For example, WRAP Sustainable Clothing Action Plan (SCAP) and the Nordic Council of Ministers report contain requirements for all four aspects but do not include any quantitative indicators. Although the Clothing Longevity Protocol only covers durability, it does contain quantitative indicators, which leads to a higher score.

Material efficiency aspects	EU Ecolabel	Nordic Swan	Blue Angel	WRAP SCAP*	Nordic Council of Ministers report	Cradle to Cradle®
Durability	3	3	3	3	2	0
Reusability	0	0	0	2	2	0
Repairability	0	0	0	2	2	0
Recyclability	0	0	0	2	2	3
Total score	**3**	**3**	**3**	**9**	**8**	**3**

**Design for Longevity* report and *Clothing Longevity Protocol*

Table 3 Comparative assessment of instruments regarding material efficiency aspects

Annex II presents in detail the aspects covered by WRAP SCAP, the EU Ecolabel and the report from the Nordic Council of Ministers, which scored higher in the assessment. The whole analysis is available upon request.

Based on the full review of indicators and thresholds as proposed in the analysed instruments, in the table below Ramboll laid out the **potential candidates for minimum requirements**. The introduction of such requirements would be a crucial step towards the circularity of textile products and the elimination of the worst performing ones from the market.

Material efficiency aspects	Indicators	Ramboll's suggestion for minimum requirements on analysed instruments
Durability	Dimensional changes during washing / drying	Dimensional changes should be between +/- 2 to 5% depending on the type of garment/fabric.
	Colour fastness	Colour fastness should be between level 3 and 4, depending on the type of impact on the garment.
	Pilling and abrasion	Pilling grade should be between 2 and 4, depending on the fabric.
	Durability of function	Durability of functions such as water repellence must be carefully assessed and added when absolutely needed for the specific function of the product.
	Care and maintenance labelling / advice	Information on care and maintenance in light of durability of the garment should be provided.
Durability Reusability Repairability	Several	Textile design should be made with a view on the longevity of the garment, e.g. include multi-functionality and allow for adjustments and repair of the garments.
Repairability	Availability of spare parts	Spare parts and patches should be made available for a certain amount of time to allow repair of the garments.
	Design for replacement / repairability	Textiles should be designed in such a way that they can be easily disassembled to allow for replacement and recycling. Easy disassembly can be measured in seconds required to remove certain parts.
Recyclability	Design for disassembly / recyclability	Textiles should be designed in such a way that they can be easily disassembled to allow for replacement and recycling.
	Limitation of certain substances, material quota	Bans and limitations for substances and materials that impede recyclability should be defined in order to reduce substance and material mixes hampering recycling.

Table 4 Existing material efficiency requirements applying to textile products

Towards material efficiency - the missing pieces

The above analysis of the existing instruments clearly points to a number of fundamental aspects which still remain unaddressed:

Minimum desired lifespan of products

The analysed instruments highlight the importance of more sustainable textiles and the need for longer use phases. However, only a small number of the instruments make a direct connection to absolute lifespans of textiles[39] and relate the indicators and thresholds to certain desirable lifespans. Furthermore, no information or requirement was identified to address how durability and a prolonged lifespan can be used to encourage reuse and repair. In terms of material efficiency aspects such as durability and reusability of textiles, a fundamental indicator to be clearly defined is the minimum desired lifespan of products or product parts in absolute terms, based on functional durability.

Definition of high-quality fabrics

Similarly, many instruments state that high-quality fabrics or durable fabrics shall be used to increase material efficiency, although this is often listed as an underlying need rather than a specific indicator. However, the exact meaning of 'high-quality fabric' as such remains without a definition. In addition, it is also unclear how it is to be differentiated from low-quality materials.

Recycled and natural fibre content

The analysed instruments make only a limited reference to recycled material content or natural fibre content of fabrics[40]. This is a crucial omission, given the relevance of these aspects for circular textiles. It needs to be kept in mind that recyclability increases with a restricted number of material types in mixed fibres and is the highest in the case of single-fibre materials.

Chemicals and material compositions for recyclability

Similarly, chemical additives and overall material composition are only marginally addressed by the instruments in relation to increased recyclability. Only the Global Organic Textile Standard contains a prohibition (Yes/No) for certain additives (e.g. aromatic solvents, flame retardants, complexing agents, heavy metals), including microplastics.

Microplastics

The textile sector is an important contributor to microplastic pollution, with over 60% of global textile fibre production being synthetic (plastic). While all textile products shed microfibres, microplastics do not biodegrade and accumulate in natural habitats, potentially degrading into nanoplastics. The possible presence of toxic chemicals and additives is also an important issue. As of today, no Life Cycle Assessment (LCA) or labelling schemes for textiles address the microplastic problem and the loss of synthetic microfibres in any sustainability assessment.

Although microplastic release as a result of abrasion or mechanical stress in general is relevant for durability and material efficiency, the shedding of microplastics overall is not addressed in any of the instruments analysed, besides GOTs[41], which highlights an important angle that is currently not covered. A preventive approach to reducing microplastics release needs to address the use of fibres that shed microplastics in the first place. Moreover, studies have shown that most microplastic releases happen in first few washes: yet another argument for a prolonged use phase of our clothes.

Just do it

ECOS recommendations for applying ecodesign to textile products

ECOS believes that textile products put on the EU market should comply with a minimum level of sustainability. **Mandatory ecodesign requirements** for textiles and textile products are needed to address minimum lifetime and durability, reusability, repairability, recyclability, prevent the presence of hazardous chemicals and limit microplastics release at all stages. They should also help improve the information communicated across the value chain.

We need ambitious legislative tools, based on comprehensive and clear methodologies to ensure measurability, enforceability and comparability among products and services. Tools must also address trade-offs between different sustainability parameters.

When setting minimum requirements for textiles, **ECOS recommends following the principles outlined below:**

Design products and systems for longer lifetimes

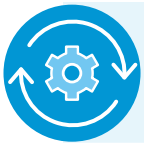
- Ensure minimum product durability and require all textile products to comply with a minimum lifetime requirement.
  - Define the desired lifespan of products in absolute terms. The lifespan of clothes is a decisive variable to reduce their environmental impacts;
  - Define testing methods that are representative of lifetime wear (in terms of hours of wear and number of washes) to achieve longer-lasting garments. Currently, the Product Environmental Footprint Category Rules developed by the European Commission define the expected lifetime of a T-shirt at 52 washes[42]. Assuming that a T-shirt is washed once a week, it would be expected to last for a year, which is clearly not ambitious enough.

- Define a clear threshold for functional durability in textiles and fabrics:
  - Set requirements for fabrics to be more resistant to pilling, improve colour-fastness properties, tear strength, and dimension stability;
  - Define high-quality fabric and textile products and clearly distinguish them from low-quality materials and textile products;
  - Define durability requirements on specific parts (especially targeting weak parts, such as seams, zippers, etc.).

- Ensure that yarns, and the way of spinning and weaving contribute to improving durability.
  - Yarns produced from different spinning technologies affect the woven fabric performance; fibre length affects the final quality of yarns and fabrics, the type of weave can influence durability, the tensile strength of the fabric, the hardness, roughness, softness and firmness of the cloth.

- Define the expected stress resistance and lifetime of a product and its components through product-specific metrics.

- Mandate the inclusion of wash and care labels on all textile products, considering their durability, alongside their minimum lifetime requirements, in a standardised form. Currently, there is no Europe-wide legislation on the use of symbols for washing instructions and other care aspects of textile articles.



Make products easier to reuse

- Facilitate reusability through clear, ambitious and mandatory targets for reuse and preparation for reuse.

- Develop product-specific standards for the assessment of upgradeability, reusability and remanufacturing to contribute to product lifetime extension. For example, fewer seams mean that larger pieces of fabric can be recovered.

- Mandate the inclusion of size and measurements on all textile products.

Make products easier to repair and upgrade

- Guarantee repairability and modularity: ensure that essential parts of products are easily replaceable, repairable and upgradable. Products must be intentionally designed for material recovery, value retention, and meaningful next use.

- Textiles should be designed to be easily disassembled, allowing for replacement and recycling.

- Develop requirements for disassembly to allow for replacement and recycling. For example, stitching rather than gluing can help disassembly and help reduce the presence of toxic substances in the supply chain.

- Define product-specific metrics to effectively assess and compare the ease of non-destructive disassembly of products.

Make products easier to recycle

- Limit the types of combination of different materials, material mix, chemicals, dyes and finishes that are not compatible with recycling. Ensure the use of safe chemicals (dyes and finishes) to avoid toxic chemicals being circulated through the recycling process. On the market, only allow products for which there is an available, mature and large-scale recycling technology[43].

- Define requirements for the ease of removal of hardware, zips and trims before recycling. Easy disassembly can be measured in seconds required to remove certain parts.

- Define requirements on recycled material commitments to ensure these are being met with material from closed loop recycling rather than with material from other waste streams[44].

- Declare chemical and material content (bill of materials and bill of chemicals). Since the presence of certain substances and materials in products poses obstacles to circularity, standards can provide formats for the communication of chemical and material content to inform recyclers of appropriate end-of-life treatment methods of specific waste streams, and thereby help the uptake of secondary raw materials.

- Set clear and ambitious 'end-of-waste' criteria for textile waste.

Focus on toxic-free, circular products and materials

- Ensure ecodesign as a policy tool is able to ensure the absence of substances of very high concern (SVHC) from textile products.

- Make REACH (Registration, Evaluation, Authorisation and Restriction of Chemicals) circularity-friendly and address textiles specificities: work is needed to frame REACH within circularity, in order to prioritise substitution efforts and to drive the elimination of hazardous chemicals.

- Restrict and substitute chemicals of concern and ensure transparency regarding chemicals present in textile products. Transparency should also apply to chemicals used in the production phase, and to material flows - with the aim of zero chemical discharge and the elimination of hazardous chemicals present throughout the value chain.

- Restrict the manufacturing, marketing, import, and export of textile products containing hazardous substances of concern. Promote available safer alternatives, including alternative materials or designs[45].

- Introduce mandatory requirements to reduce the use of hazardous chemicals, as well as to trace and disclose information regarding their use. Disclosing information on the chemicals used in finished products and during production processes is needed, and ensuring their traceability is crucial. Between 60-80% of textile products sold in Europe are manufactured outside of the EU. Policies must aim to prompt effective chemical management throughout the whole value chain.

- Ensure structured data gathering on chemicals in textiles, including e.g. heavy metals, dyes, phenols, phthalate, flame retardant, PFAS, formaldehyde, etc. This information is a prerequisite for any targeted regulatory activity.

- Investigate chemical additives, including dyes, anti-wrinkle agents, water repellents, flame retardants, antibacterial agents, and their wider effect on circularity.

- Investigate the possibility to provide a positive list of chemicals that can be used in textile products and ban the use of unsuitable chemicals (similar to the approach taken by the EU Cosmetics Regulation, which banned the use of many substances in cosmetics, and provided a list of those allowed).

Limit microplastics release from textiles

- Set maximum levels of microplastic release allowed during production, use phase, and end-of-life.
- Set minimum biodegradability requirements for microfibres.
- Incorporate microplastics pollution considerations in all main instruments tackling textile products (Product Environmental Footprint, PEFCRs, etc.[46]).
- Ensure that products are less prone to wear through design, choice yarns and the way of spinning and weaving (e.g. high twist yarns are to be preferred for shed reduction).
- Reduce the amount of wear emitted per wash (through design and filters – in domestic and industrial washing machines, tumble dryers, washer dryers, dryers and washer, etc.) and showcase this information to consumers.
- Explore the potential of setting rules on industrial pre-washing in European processes, as research shows most fibres are shed in the first few washes. This would put the responsibility on the producer in line with the 'polluter pays' principle.

Promote raw materials that are sustainably and ethically sourced

- Promote sustainably and ethically sourced materials – provided these are used for longer lifetimes, go hand-in-hand with overall reduction of virgin resource use, e.g. with a view to address and reduce the volume of synthetic fibres made from fossil fuels.
- Holistically assess the interest of replacing fossil raw materials with sustainably sourced bio-based feedstock. This is not an ecodesign approach as such and there are important issues that need to be addressed first: the respect of the cascading use principle[47], stating the importance to prioritise between the use of the same biological resource and piece of land (food, materials or energy) to maximise the environmental and social values; and the fact that the overuse of biological resources needs to be tackled[48], before considering the potential of biomass to mitigate resource depletion, it is important to define how much can be produced without going beyond the Earth's carrying capacity.
- Set up an ambitious mandatory horizontal due diligence legislation that ensures the full lifecycle of textiles is covered.

Introduce Extended Producer Responsibility for textiles

Producers must be responsible for the environmental and social performance of their products along the whole value chain. There already is an instrument to ensure they are held accountable: Extended Producer Responsibility, following the 'polluter pays' principle. ECOS calls for an EPR scheme for textiles which respects and implements the EU waste hierarchy, promoting durability, reuse and repair first and foremost – not only focusing on the end-of-life stage. The system should have a clear, transparent and democratic governance, and the following principles must be observed:

- Complement the minimum performance requirements laid out above by EPR eco-modulation fees, according to environmental performance along the value chain and circularity potential.

- Fees paid by the producer should vary according to specific criteria relating to aspects of product environmental performance, with more 'environmentally-friendly' products charged at a lower rate to incentivise ecodesign. The systematic modulation of EPR schemes could be coupled by the setting up of a bonus/malus schemes to reflect circular performances (e.g. durability, reusability/adaptability, repairability/reversibility, recycled contents). There are significant practical considerations to be discussed in terms of the criteria to be used to determine fees.

EPR schemes should be coupled with ambitious use and preparing for reuse targets, making sure that local reuse is prioritised. It should go beyond garments and footwear, to include household textiles, carpets, mattresses, and other types of textiles.

Additionally, we call for a strong implementation of a mandatory ban on the destruction of textile products (including those unsold, excess inventory, deadstock and return items) to send a strong signal to production and logistics, openly addressing overproduction.

Introduce a product passport to ensure traceability and transparency

Supply chain transparency is a priority. Movements need to be captured and communicated across the supply chain, including product traceability, components, the actors involved, production processes, distribution, and lifecycle events. It is essential to:

- Introduce a product passport to ensure transparency and traceability. It should include a bill of materials and a bill of chemicals, environmental information, as well as information on repairability, durability, and due diligence (social and environmental), essential information regarding product circularity and links to external valuable data sources (LCAs, certifications, etc.).

- Develop standards on product and component-related information to support the development of a product passport. Standards should integrate aspects related to durability, repairability, composition, etc.

- Set mandatory requirements for 'Made in' labelling criteria and conditions. Labelling the country of origin ('Made in') is not yet legally required in the EU and needs to be clearly regulated.

ECOS is convinced that a digital product passport is a centrepiece to the circular economy, providing all the necessary information within the common European Circular Dataspace. Insufficient information about chemical content in products, materials, and waste streams remains a bottleneck for sustainability and circularity in the textile sector.

Moreover, traceability will provide insights on where the products are currently lying, as well as their quantity and quality to help with improved circular suggestions and decision making. Advanced information and data exchange will ensure an effective communication amongst all actors in the value chain. This will improve the optimisation of circular operations, and the fulfilment of regulatory and compliance needs (e.g. substances of concern, REACH SDS, etc.), feeding the assessment of circularity.

Conclusion

In order to transform the textile sector, we need a clear, mandatory and ambitious set of minimum ecodesign requirements, supported by appropriate technical standards. Such requirements would improve the design and manufacturing phases of products, and dramatically increase their potential to be reused, repaired and recycled. Requirements need to be complemented with (rather than driven by) better information for consumers and stakeholders across the value chain. This recipe has already proven successful in other sectors, namely energy-related products.

In this report, we have listed feasible options to implement minimum ecodesign-type requirements for textiles, targeting circularity and other aspects such as improved durability, reusability, repairability and recyclability. Our proposals also include ideas to target the presence of chemicals and the shedding of microplastics – in both areas there are standardisation gaps to be filled if we are to improve circularity. We call on governments to implement these recommendations: only this way can we make sure that the planet does not become the ultimate fashion victim.

It is time for the textile industry to take long-overdue steps and put the sector back on track towards achieving true circularity, and finally do away with the disastrous linear 'fast fashion' model.

Illustration: Visual Thinkery

Annex I
Standards must-haves for circular textiles

ECOS works on the development of international and European standards with a view to boost circular economy and material efficiency aspects in the textiles sector.

Circularity is essential to reducing the environmental impacts of textiles, and the development of a number of key standards is an important step in progressing towards environmental sustainability.

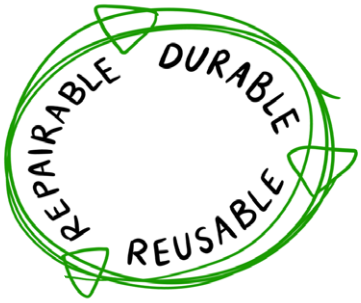


Illustration: Visual Thinkery

Standards can provide important tools to support the implementation of circular economy principles in textiles, and ECOS believes that, in standardisation, the following topics should be prioritised:

- Definition of sustainable and circular textiles, based on circularity performance of textiles, addressing their material efficiency, the absence of substances of concern, and the minimisation of microfibre release.
- Design principles for durability, repairability and lifetime optimisation to minimise raw material use, increase durability, reuse, repairability, and recyclability.
- Methods to:
  - assess durability, repairability and recyclability;
  - determine the amount of recycled content, of bio-based content, and presence of chemicals;
  - quantify the shedding of microfibres and the biodegradability of microplastics;
  - assess and validate products and materials for reuse;
  - assess and validate products and materials derived from waste and recycled sources.
- Standardisation of circular waste management practices, laying out processes that encourage textile reuse and high-quality textile-to-textile recycling.
- Development of new standards to assess and declare certain parameters relevant to material use such as reduced use of virgin material, increased material recovery and the share of recycled content, as well as relating to material quality to facilitate the use of low-carbon materials and to reduce the use of hazardous substances.
- Product standards to include and describe requirements regarding the reusability and longevity of products during their life cycle, to contain suitable technical specifications to be recyclable.

Annex II

Deep dive: WRAP SCAP, EU Ecolabel and report from the Nordic Council of Ministers

Based on the initial list of instruments and their assessment, a set of instruments were selected by Ramboll for further in-depth analysis: EU Ecolabel, Nordic Swan, Blue Angel, WRAP SCAP*, Nordic Council of Ministers report, and Cradle to Cradle®. Criteria for the selection of these instruments included a broad coverage of the identified aspects relevant for material efficiency as well as the available quantitative or qualitative indicators (requirements) relating to these aspects.

Ramboll analysed this short list using desk-based research with a focus on publicly available information. Results were translated into a factsheet for each instrument comprising:

- short description of functioning and background;
- purpose of the instrument in relation to the increase of material efficiency of textiles;
- requirements / indicators used;
- identified gaps / areas not covered by the instrument;
- challenges;
- similarities with other instruments;
- overall assessment of the instrument;
- references.

Here below, we present an in-depth analysis of instruments that scored the highest in the assessment (Wrap, EU Ecolabel, Nordic Councill of Ministers report). The whole analysis is available upon request.

WRAP Design for Longevity and Clothing Longevity Protocol

WRAP Design for Longevity[49] was launched in 2013. It addresses resource efficient business models, design for extending clothing life, fibre and fabric selection, consumer behaviour and reuse and recycling. It focuses on four key areas: size and fit, fabric quality, colours, styles and care. The report offers best practices and preferred solutions for each category of clothing, addressing suitable fibre and fabric choice, design and manufacturing, care and repair and reuse and discard.

In 2014 WRAP published a second report, the *WRAP Clothing Longevity Protocol*[50], which provides guidelines for tests and performance criteria to drive performance levels. The two main tools in the protocol are a check list to support decision making for longevity and testing and performance standard guidelines.

Requirements

The Design for Longevity report provides requirements or recommendations for eight categories. For example, requirements or recommendations for children's wear include in-growth allowance of garments, durable and colourfast fabrics that allow for frequent laundering, fabric finishes to resist staining, multi-functionality of garments, design and manufacturing considering practicality and wear resistance, e.g. through reinforced parts on knees and elbows, spare patches and buttons for repair and large neck openings. It specifies that, in order to achieve longer-lasting garments, it is appropriate to use a testing regime that is more representative of lifetime wear.

Design for recycling should be included, for instance through using a single fabric or easy disassembly[51]. The report also addresses education of consumers (e.g. for care or reuse) or alternative business models for companies.

The protocol's checklist contains questions for different product development stages relating to qualitative requirements, e.g. availability of test reports from fabric suppliers or the execution of wearer trials. The test and performance guidelines (Annex 2) provide detailed requirements for five categories of textiles (knitwear, shirt, jeans, socks, t-shirt) and eight core tests:

- dimensional stability to washing/dry clean;
- pilling;
- care label wash with visual assessment;
- colour fastness to: washing/dry clean, water or perspiration, light, rubbing;
- spirality;
- seam slippage;
- seam strength;
- fusible lamination.

For the same garment categories, the protocol contains examples of current and desired wash and wear estimates (e.g. current lifetime or number of washes)[52].

Identified gaps / areas not covered by the instrument

No quantitative requirements and indicators are provided. Reference to test methods is made occasionally but without thresholds.

Overall assessment of the protocol

The instrument is comprehensive in the way it addresses the four aspects of material efficiency (i.e. durability, reusability, repairability, recyclability) and differentiates between important categories of textiles regarding the recommendations. However, only qualitative descriptions are provided, and the framework is voluntary and limited to the UK.

Table 5 *WRAP Design for Longevity and Clothing Longevity Protocol*

Potential Ecodesign Requirements for Textile and Furniture, a report by the Nordic Council of Ministers

In 2018, the Nordic Council of Ministers, a forum for official Nordic cooperation, published *Potential Ecodesign Requirements for Textile and Furniture*[53], a report setting specific design requirements to extend the life of products and offset new production, reduce the production of virgin material with recycled material, and adjust the recommended laundering procedure to reduce water and energy consumption. Furthermore, the report provides detailed bills of materials/product passport[54].

Requirements

The proposed requirements to increase material efficiency include, generally:

A minimum threshold for recycled content of the produce and packaging material

Improved durability of fasteners and textile material with regards to:

- colour-fastness (washing, perspiration, wet and dry rubbing);
- resistance to abrasion;
- resistance to product dimension change;
- durability during washing and drying;
- improved design for disassembly;
- increased availability of spare parts or components for repair;
- a maximum threshold for chemical content;
- a detailed list of materials comprising the product (bill of materials).

The potential requirements are accompanied with qualitative thresholds and relevant indicators.

Identified gaps / areas not covered by the instrument

No quantitative thresholds are provided for the requirements.

Overall assessment of the instrument

Comprehensive selection of potential qualitative requirements with actionable, if ambitious, criteria.

Table 6 Nordic Council of Ministers – *Potential Ecodesign Requirements for Textile and Furniture*

EU Ecolabel

The EU Ecolabel is a voluntary eco-labelling scheme from the European Commission, which has encouraged the use of sustainable practices in textile manufacturing since 2009. Textile products using the EU Ecolabel[55] are characterised by a more sustainable fibre production, a durable product, less pollution from production process, and strict limits on the use of hazardous substances. The EU Ecolabel specifies nine 'fitness for use criteria' that relate to material efficiency, specifically durability. Products using the ecolabel need to fulfil these criteria and may therefore be more durable and material efficient than non-labelled textile products.

Requirements / indicators used
Specifications exist on durability for intermediate fabric and knitted products as well as different final products: • dimensional changes during washing and drying; • colour fastness to: washing, perspiration, wet rubbing, dry rubbing, light; • wash resistance and absorbency of cleaning products; • fabric resistance to pilling and abrasion, and • durability of function[56]. Information is provided regarding the assessment and verification for each criterion, e.g. linking to ISO standards. Besides the requirements on durability, the EU Ecolabel addresses textile fibre criteria, criteria regarding chemicals and processes and corporate social responsibility criteria[57].
Identified gaps / areas not covered by the instrument
No requirements exist in regard to reusability, repairability and recyclability of textile products. For durability, the instrument does not specify the desired lifespan of products in absolute terms. The criteria can help increase the durability, but it is not specified to what extent in comparison with non-labelled products.
Overall assessment of the instrument
Comprehensive instrument regarding durability requirements but lack of requirements on reusability, repairability, and recyclability. Widely known and accepted instrument.

Table 7 EU Ecolabel for textiles

Notes and references

1 European Environmental Agency, *Textiles in Europe's circular economy*, November 2019 https://www.eea.europa.eu/publications/textiles-in-europes-circular-economy

2 WRAP, *Changing our clothes: Why the clothing sector should adopt new business models*, June 2020 https://wrap.org.uk/sites/default/files/2020-07/WRAP-changing-our-clothes-why-the-clothing-sector-should-adopt-new-business-models.pdf

3 WRAP, *Valuing our clothes- The True cost of how we design, use and dispose of clothing in the UK*, page 4, 2012.

4 European Commission, *Sustainable Products in a Circular Economy - Towards an EU Product Policy Framework contributing to the Circular Economy*, Commission staff working document, 2019.

5 European Commission, *Priorities 2019-2024, A European Green Deal*, https://ec.europa.eu/info/strategy/priorities-2019-2024/european-green-deal_en

6 The Ecodesign Directive currently sets legally-binding/mandatory minimum requirements for energy-related products on the EU market. Until recently, these requirements were mainly focused on energy-efficiency, but material-efficiency aspects are increasingly taken into account. Energy labelling and ecodesign are estimated to bring annual energy savings of approximately 230 Mtoe (million tonnes of oil equivalent) by 2030.

7 European Environmental Agency, *Textiles in Europe's circular economy*, November 2019 https://www.eea.europa.eu/publications/textiles-in-europes-circular-economy

8 Mistra dialogues, *Investor Brief: Sustainability in Textiles and Fashion*, 2020 https://www.mistra.org/wp-content/uploads/2020/09/mistradialogue_rapport_investor_brief_textiles_final.pdf

9 European Environmental Agency, *Textiles in Europe's circular economy* November 2019 https://www.eea.europa.eu/publications/textiles-in-europes-circular-economy

10 *ibid.*

11 European Parliament, *The impact of textile production and waste on the environment* (infographic), 3 March 2021, https://www.europarl.europa.eu/news/en/headlines/society/20201208STO93327/the-impact-of-textile-production-and-waste-on-the-environment-infographic

12 By weight, the volume of clothing is twice that of household textiles. Household consumption of textiles and clothing reached 527.9 billion EUR in 2017. Tops, underwear, jackets, and bottoms have the highest environmental impact.

13 Ertz et al., M. Ertz, S. Leblanc-Proulx, E. Sarigöllü, V. Morin, *Made to break? A taxonomy of business models on product lifetime extension*, 2019 https://www.sciencedirect.com/science/article/abs/pii/S0959652619322292

14 WRAP, *Design for Longevity Guidance on increasing the active life of clothing*, 2013 https://www.researchgate.net/publication/313479112_Design_for_Longevity_Guidance_on_Increasing_the_Active_Life_of_Clothing

15 WRAP, *Extending clothing life protocol*, 2016 https://wrap.org.uk/resources/guide/extending-clothing-life-protocol

16 European Commission, *Sustainable Products in a Circular Economy - Towards an EU Product Policy Framework contributing to the Circular Economy*, Commission staff working document, 2019 https://ec.europa.eu/environment/circular-economy/pdf/sustainable_products_circular_economy.pdf

17 Ellen MacArthur Foundation, *A New Textiles Economy: Redesigning fashion's future*, 2017 https://www.ellenmacarthurfoundation.org/assets/downloads/publications/A-New-Textiles-Economy_Full-Report.pdf

18 WRAP, *Design for Longevity Guidance on increasing the active life of clothing*, 2013.

19 WRAP, *Guidance on re-use and recycling*, https://wrap.org.uk/taking-action/textiles/actions/re-use-and-recycling

20 Nordic Council of Ministers *Ecodesign Requirements for Textiles and Furniture*, 2018 https://norden.diva-portal.org/smash/get/diva2:1221509/FULLTEXT01.pdf

21 European Commission, *Circular Economy Action Plan. For a cleaner and more competitive Europe*, 2020, https://ec.europa.eu/environment/circular-economy/pdf/new_circular_economy_action_plan.pdf

22 REACH regulation, the Industrial Emissions Directive, the Textile Regulation (EU) No. 1007/2011 and the reference documents on best available techniques (BREF) for the textile industry.

23 ECOS - Environmental Coalition on Standards, *ECOS response to the EU Strategy for Textiles Roadmap*, 2 February 2021, https://ecostandard.org/wp-content/uploads/2021/02/ECOS-response-to-the-EU-Strategy-for-Textiles-Roadmap.pdf

24 8.5% reduction in gross EU energy consumption, 12.3% in 2030, 6.4% reduction in total GHG emissions, 10% in 2030, -3% of NOx, -2% of CO, -1.6% of PM in 2030. European Commission Impacts Accounting Report 2018.

25 For energy-related products, there are eight standards containing generic principles to consider when addressing the material efficiency of energy-related products, such as extending product lifetime, ability to reuse components or recycle materials from products at end-of-life, and use of reused components and/or recycled materials in products.

26 More information in Annex I.

27 Laitala, Kirsi, Ingun Grimstad Klepp, Vilde Haugrønning, Harald Throne-Holst, and Pål Strandbakken, *Increasing repair of household appliances, mobile phones and clothing: Experiences from consumers and the repair industry*, 2020. Journal of Cleaner Production. https://doi.org/10.1016/j.jclepro.2020.125349

28 WRAP, *Design for extending clothing life - casualwear*, 2016, https://wrap.org.uk/resources/report/design-extending-clothing-life

29 WRAP, *Clothing Durability Report*, 2015 https://www.teraz-srodowisko.pl/media/pdf/aktualnosci/1694-Clothing-Durability.pdf

30 Ungerth, L. and Carlsson, A. *Vad Händer Sen Med Våra Kläder? Enkätundersökning (What Is Done with Our Clothes? A Survey)*. Konsumentföreningen, Stockholm, 2011 https://docplayer.se/344015-Konsumentforeningen-stockholm-vad-hander-sen-med-vara-klader-enkatundersokning-april-2011.html

31 Laitala, K., Boks, C., and Grimstad Klepp, I. *Making Clothing Last: A Design Approach for Reducing the Environmental Impacts*. International Journal of Design Vol. 9 No. 2, 2015.

32 Sandin, Peters, *Environmental impact of textile reuse and recycling* – a review, 2018 https://www.sciencedirect.com/science/article/pii/S0959652618305985

33 Worth mentioning that clothes sold at higher prices might not intrinsically be more durable.

34 Ungerth, L. and Carlsson, A. *Vad Händer Sen Med Våra Kläder? Enkätundersökning (What Is Done with Our Clothes? A Survey)*. Konsumentföreningen, Stockholm, 2011.

35 Nordic Council of Ministers, *Potential Ecodesign Requirements for Textiles and Furniture*, 2018.

36 WRAP, *Design for extending clothing life - casualwear*, 2016, https://wrap.org.uk/resources/report/design-extending-clothing-life

37 *Ibid.*

38 Bjørn Bauer, David Watson, Anja Gylling, Arne Remmen, Michael Hauris Lysemose, Catharina Hohenthal and Anna-Karin Jönbrink, *Potential Ecodesign Requirements for Textiles and Furniture*, Nordic Council of Ministers, 2018, https://norden.diva-portal.org/smash/get/diva2:1221509/FULLTEXT01.pdf

39 Cooper et al. estimated the total number of wears of five different garment types, estimating that knitwear is worn 111 times, shirts 58 times, jeans 233 times, socks 90 times and t-shirts 83 times.(Cooper, T.; Claxton, S.; Hill, H.; Holbrook, K.; Hughes, M.; Knox, A.; Oxborrow, L. *Clothing Longevity Protocol*;Project Code: REC100-008; Nottingham Trent University Banbury: Banbury, UK, 2014). A Dutch study estimated that the average lifespan of trousers was 6.2 years, skirts and dresses 15.2 years, sweaters 7.1 years, blouses 7.2 years, t-shirts 6.8 years, blazers 11.5 years and jackets 11.6 years (Uitdenbogerd, Brouwer, & Groot-Marcus, 1998, p. 127).

40 Instruments with reference to recycled or natural fibre content: Cradle to Cradle®: material utilisation score and recycled material content; JRC report: textiles to contain a minimum of 70% of certified organic natural fibres; The Jeans Redesign Guidelines: Inclusion of at least 98% cellulose-based fibres based on total weight.

41 Solely the Global Organic Textile Standard contains a prohibition (Yes/No) for certain additives, including microplastics.

42 Technical Secretariat of the T-shirts PEFCR pilot, *Product Environmental Footprint Category Rules (PEFCR), T-Shirts*, 2019, https://ec.europa.eu/environment/eussd/smgp/pdf/PEFCR_tshirt.pdf

43 Complex textiles are obtained based on 2 or 3 fibres, but also combinations of 4 or 5 fibres are not unusual.

44 Business of Fashion, *How luxury became fast fashion*, 5 October 2020, https://www.businessoffashion.com/opinions/luxury/op-ed-luxury-fast-fashion-collaboration-karl-lagerfeld-hm

45 An encouraging approach has been taken by the Swedish government which has proposed a tax on clothing and footwear products that contain SVHCs under EU REACH rules.

46 As far as we know, there are no plans to take this into account.

47 The so-called 'cascading use of biomass' principle indicates that food should be prioritised over materials, which can then offer a second useful life in the form of nutrients and, lastly, can be converted into bioenergy.

48 Biomass, and the resources needed such as land, water and nutrients to grow and convert such biological resources into useful products, are all limited and require time to grow and regenerate.

49 Waste and Resources Action Programme (WRAP) is a UK charity that promotes and encourages sustainable resource use through product design, waste minimisation, reuse, recycling and reprocessing of waste materials. It is also 'taking action to transform the way the fashion and textiles industry buys, uses and reuses textiles and clothing'. WRAP led the Sustainable Clothing Action Plan (SCAP) between 2012 and 2020, bringing together different stakeholders (fashion brands, retailers, manufacturers, local authorities, recycling, reuse and waste management companies) to reduce the impacts of clothing consumed in the UK. Within this work, they published two reports. https://www.wrap.org.uk/sustainable-textiles/scap

50 Cooper, Tim & Claxton, Stella & Hill, Helen & Holbrook, K & Hughes, M & Knox, A & Oxborrow, Lynn, *Development of an Industry Protocol on Clothing Longevity*, 2014, https://www.researchgate.net/publication/313479105_Development_of_an_Industry_Protocol_on_Clothing_Longevity

51 https://wrap.org.uk/resources/report/design-extending-clothing-life

52 WRAP, *Clothing Longevity Protocol*, 2014, https://wrap.org.uk/sites/default/files/2021-03/WRAP-clothing-longevity-protocol.pdf

53 Bjørn Bauer, David Watson, Anja Gylling, Arne Remmen, Michael Hauris Lysemose, Catharina Hohenthal and Anna-Karin Jönbrink, *Potential Ecodesign Requirements for Textiles and Furniture*, Nordic Council of Ministers, 2018, https://norden.diva-portal.org/smash/get/diva2:1221509/FULLTEXT01.pdf

54 'The product must include, or link to, a list of all materials included in the product and at what level they are pure or mixed with other materials, and the share they make up by weight of the product down to a chosen threshold (e.g. 1%)'

55 European Commission, *The EU Ecolabel for Textiles products "The official European label for Greener Products"*, https://ec.europa.eu/environment/ecolabel/documents/textile_factsheet.pdf

56 European Commission, *EU Ecolabel textile products User Manual*, July 2019, https://ec.europa.eu/environment/ecolabel/documents/EU%20Ecolabel%20-%20User%20Manual%20Textile%20Products.pdf

57 Commission Decision 2014/350/EU of 5 June 2014 establishing the ecological criteria for the award of the EU Ecolabel for textile products (notified under document C(2014) 3677) https://eur-lex.europa.eu/legal-content/EN/TXT/PDF/?uri=CELEX:32014D0350&from=EN

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