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# Your T-Shirt Deserves to Last: Negotiating Ecodesign Requirements for Garments

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STUDENT REPORT

# Title page

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# Abstract

The rapid production and consumption of garments deplete resources, release pollutants into our environments, and generate more waste than we can responsibly handle. The European Union (EU) has recognised the need for change and has published the European Green Deal and subsequent initiatives to move towards a more circular and sustainable future. A defining factor for the environmental impact of garments is how long we use them. Therefore, this thesis focuses on the EU's Ecodesign requirements for Sustainable Products (ESPR) framework and explores how ecodesign requirements can address the issues associated with premature end of use. The objective was to define information and performance requirements that will support long and active use and thereby provide a foundation for negotiations of the final ecodesign requirements. This thesis utilises an actor-network and staging negotiations approach and literature reviews to define relevant requirements in collaboration with human and non-human actors and presents our final recommendations. This work has highlighted the importance of addressing the value of garments and consumer behaviour to promote sustainable consumption patterns, as prolonged use does not necessarily follow more durable garments. Any environmental benefits derived from these requirements will depend on how the minimum expected lifetime is defined, whether consumer behaviour can be transformed by initiatives combined with the ESPR, and finally, what data is used to qualify requirements through environmental impact assessment. If these elements are not addressed, ecodesign requirements may lead to a further plasticisation of garments and associated rebound effects.



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## Reading Guide

This thesis is the final product of our master's degree in Sustainable Cities at Aalborg University, Copenhagen. For this reason, the report will contain a chapter on theory and methods and describe our strategic design choices and results from negotiations with actors through an actor-network lens.

For readers whose primary interest is the recommendations for eco-design requirements on garments under the ESPR, these can be found in Chapter 7. We also recommend reading chapters 8-9 on the potentials and limitations of the ESPR Framework to transform the garments industry's production and consumption patterns.



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# Sammenfatning

Produkter på EU's interne marked skal designes til cirkulære produktions- og forbrugsmønstre således de negative miljøpåvirkninger forbundet med produkternes livscyklus reduceres. Det er hovedformålet med EU's forordning om Miljøvenligt Design for Bæredygtige Produkter (ESPR), der sætter rammerne for fremtidens miljøvenligt design igennem produktkrav. Forordningen er sammenkoblet med andre EU initiativer for cirkulær udvikling som; The European Green Deal, The New Industrial Strategy (SI) samt The New Circular Economy Action (CEAP). Hertil dækker den en meget bred vifte af produkter, heriblandt tekstiler og sko. En kategori, som indtager femte pladsen, når der er tale om negative indvirkninger på miljøet og klimaforandringer i EU. Ligeledes en branche, der indtil nu har været gået under radaren i henhold til regulering. Produktkrav for miljøvenligt design under ESPR forordningen ses derfor som en gylden mulighed for at udfase fænomenet Fast Fashion, der driver en chokerende høj produktionshastighed og holdbarheden af tøj tilsvarende lav.

Denne afhandling i Sustainable Cities fremlægger mulige produktkrav for miljøvenligt design af tøj, der kan skabe rammerne for en forlænget holdbarhed samt en forlænget brugsfase af tøj. Derigennem fremlægger den muligheder for at nedsætte forbrugshastigheden af tøj med fokus på brugsfasen. Kravene er indsendt som en del af et høringssvar til EU's forordning om Miljøvenligt Design for Bæredygtige Produkter d. 5. maj. Hertil demonstrer afhandlingen, hvordan et høringssvar kan designes til at facilitere forhandlinger omkring fremtidens produktkrav for tøj. Afdækningen er foretaget ud fra et aktør netværks perspektiv, med analytiske indsigter fra frameworket Staging Negotiation Spaces.

For at kunne fremlægge mulige produktkrav, med evnen til at skabe forhandling blandt relevante aktører, indeholder afhandlingen en analyse af det forhandlingsrum, der skaber rammerne for hvilke evner produktkrav skal have for at kunne debatteres under ESPR'en samt hvordan disse er inskriberet i høringssvaret. Forhandlingsrummet er domineret af et netværk af nonhumane aktører, i form af EU initiativer heriblandt; The European Green Deal, IS, CEAP samt Strategy for Sustainable and Circular

Textiles (SSCT). Disse nonhumane aktører, definere i høj grad hvilke produktkrav, der kan formuleres under ESPR'en og derved forhandlingsrummet et hørings svar skal kunne bevæge sig i. Grundlæggende konkluderer analysen at mulige produktkrav skal understøtte The Green Deals mål om at transformere EU til en cirkulær økonomi: Ved at støtte revolutionen af tekstilindustriens produktionsmønstre og øge udbuddet af, og efterspørgslen efter, bæredygtige varer. Samtidig med at mulige krav understøtter SSCTs mål om at udrydde Fast Fashion ved at forlænge levetiden af tekstiler baseret på bæredygtigheds- og cirkularitetsaspekterne fremlagt i The New Circular Economy Action.

De fremlagte produktkrav er baseret på en litteratur analyse, der har haft til formål at identificere faktorer, der er medvirkende til, at tøj kasseres tidligt i dets levetid. Denne litteratur analyse resulterede i en indledende liste over mulige produktkrav, der efterfølgende blev fundament for forhandlinger i arbejdet med at kvalificere og validere kravene. Resultatet af forhandlinger, tilretninger og yderligere forhandlinger med relevante aktører i og omkring tekstilindustrien blev følgende liste af produkt krav i relation til produktaspekter relevant for brugsfasen:

Mulige Produktkrav	Produktaspekter				
	Holdbarhed	Pålidelighed	Genbrugsmuligheder	opgraderingsmuligheder	reparationsmuligheder
Størrelses label med kropps målinger angivet i cm		x	x		
Minimum fiberlængde	x		x		x
Maksimal dimensioner i % ved krympning efter vask og tørring	x	x			
Maksimal nuller af x	x	x	x		
Farveægthed, vask, nedbør, våd og tør gnidning, lys/UV-eksponering	x	x	x		
Pleje- og vedligeholdelseslabel	x				x
Maxiksimal % af elastan	x		x	x	x
Minimum trækstyrke af sømme	x	x	x		
Grænseværdi for kemikalier, der er skadelige for mennesker og økosystemer		x	x		

Afhandling diskutere hertil de potentielle miljømæssige fordele afledt af de fremlagte krav. Særligt ligger der vægt på, at de miljømæssige fordele i høj grad afhænger af, hvilken minimumslevetid, der fastlægges for tøj, samt hvordan den reflekteres i udregningen af miljøpåvirkninger. Datakvaliteten og Livscyklus vurderinger som værktøj til at udregne miljøpåvirkninger diskuteres også med fokus på risikoen for at fremme en yderligere plastificering af industrien. Ydermere, at det kæver en forandring af forbruger adfærd, der i høj grad skal understøttes af initiativer, der ikke kan favnes af ESPR'en. Ligeledes understreges det, at prisen på tøj – der i øjeblikket er uhensigtsmæssig lav - har en direkte indflydelse på, om initiativer som leje, reparation eller endda indkassere produktgarantier af forbrugeren anses for økonomisk og følelsesmæssigt rentabelt og mindre besværligt end at købe nyt tøj.

Overordnet konkluderes det, at faktorerne for potentielle miljømæssige fordele er komplekse og uforudsigelige, hvorfor det på nuværende tidspunkt er svært at give et estimat på de miljømæssige fordele afledt af de fremlagte krav. Dog understreges det, at en forlænget brugsfase er dominerende for at mindske miljøbelastningen af tøj.

Afhandlingen har fremlagt produktkrav og etableret forhandlinger omkring disse, ESPR'ens muligheder og udfordringer samt hvad der er centralt for at nedbringe miljøaftrykket af nuværende og fremtidige tekstiler. Derved bidrager afhandlingen til at skabe et grundlag for udviklingen af fremtidens produktkrav for miljøvenligt design af tøj.



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OT

# Introduction

## 1.1 Background

The consumption of textiles currently accounts for the fifth-highest negative impact on the environment and climate change in the EU (Duhoux et al., 2022; Köhler et al., 2021). The impact of the textile sector on our world is manifold, as our continued consumption depletes fossil, water, and land resources and releases harmful chemical pollutants and microplastics into the environment. The fashion industry is also the cause of multiple negative social impacts, including perpetuating modern slavery and child labour (Ellen MacArthur Foundation, 2017).

Between 1996 and 2018, the average household spend on garments increased in the EU, and in the same period, the prices of clothes decreased by more than 30% (Duhoux et al., 2022; Köhler et al., 2021). The phenomenon of *fast fashion* was born.

Fast fashion was described by Barnes and Lea-Greenwood (2006) as a concept wherein retailers and their supply chain maximise sales by being as responsive as possible to unpredictable and rapidly changing market demands. This has prompted an industry where the lead time (the time from initiation of production until the product hits the shelves) is continuously minimized to get the newest product on the shelves, often by eliminating stages of production such as quality control and product development. To respond rapidly to market demand driven by heavy marketing, retailers minimize inventory and work with an increasing number of suppliers to produce an increasing number of styles and varieties in smaller production volumes, often continuing or discontinuing products according to sales data (Barnes et al., 2006). In the current fashion climate, brands provide up to 24 new collections yearly (European Environment Agency, 2021). Resulting in retailers ultimately having less oversight over their supply chains compared to other industries and subsequently less influence on production and labour practices, as well as their environmental impacts.

Fast fashion is, ultimately, a supply-chain management system which results in garments being produced faster, at a lower price, and in a lower quality (Barnes et al., 2006) while also being used for a shorter period (European Commission, 2022f).

On the back end of this system is an overburdened second-hand market resulting in the mass export of textiles to third-world countries and landfilling, as well as virtually no recycling (2020).

The principles of circular economy propose that the solution to these problems is redesigning the current textile economy to narrow consumption, slow the utilization of garments and increase direct reuse, repair, and recycling (Ellen MacArthur Foundation, 2017). All these aspects are needed to lower the environmental impact of garments on our world. However, it is ultimately by buying and using fewer clothes for longer that we can address the inherent problems and mechanics of fast fashion, which drives the acceleration of our current garment consumption.

Currently, the mechanics of Fast fashion are such that there is very little incentive or capability for large retailers and distributors to independently design and produce garments that will retain their aesthetic and physical functionality throughout many years of use and thereby make possible a slowing of resources. There is a need for systemic change in the fashion industry to remove textiles that cycle out of use quickly to the detriment of our environment, as well as a comprehensive change in consumer behaviour.

In response to this need, the EU published the European Green outlining important actions for transforming the EU's economy for a circular and sustainable future (European Commission, 2019) thereby signalling a tsunami of new regulations in the upcoming years that will move the EU in a more circular direction.

Prior to the Green Deal and the following initiatives, there has been little to no regulation

of the textile industry. For an overview of initiatives that have come on the back of the Green Deal, which influences the textile industry, see Figure 1.

This thesis focuses on the EU's framework for Ecodesign requirements for sustainable products (ESPR), in relation to garments, which was open for public consultation from the 31st of January 2023 to the 12th of May 2023. The ESPR will provide an opportunity for the EU to address the performance and information deficiencies typical in garments that lead to premature disposal. Ecodesign requirements pose a major opportunity to regulate the textile market, which is needed, as it is estimated that the average use of a t-shirt is just 45 uses before disposal (Quantis, 2021).

The EU's ESPR and subsequent work to establish product requirements present a window of opportunity to set performance and information requirements for textiles and thereby garments. This thesis explores, discusses and informs how ecodesign requirements can be used as a tool to narrow and slow the unsustainable production and consumption patterns of garments and make fast fashion out of fashion.

Ecodesign requirements have historically been successful in promoting better products in the EU. Notably with information requirements on energy efficiency, through the energy labelling and repealing directive resulting from the Ecodesign Directive, which have removed the worst-performing products from the EU market over time (European Commission, 2015b).

Garments as a product category are incredibly complex, with many areas that need addressing in the resource extraction, production, distribution, use and end-of-life stages. In this thesis, we will not bog ourselves down with the debate over which specific materials or fibres are the least environmentally damaging. Rather, we will point out that the preferred garment must be the one substituting the production of new textiles through continuous and active use, reuse, and repair.

It is with all this in mind that we set out to engage relevant actors in negotiations on what ecodesign requirements would be effective in enabling garments to have a prolonged and active use phase.

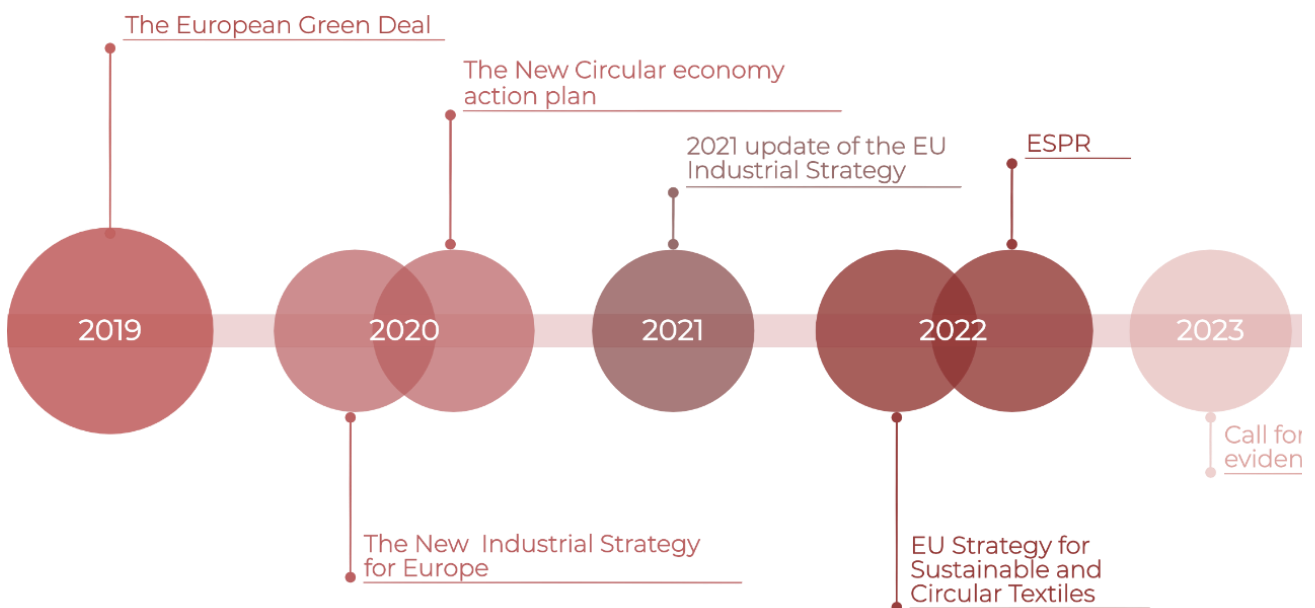


Figure 1: An overview of the relevant EU strategies, action plans and other relevant documents in relation to the ESPR and garments. Own illustration.

## 1.2 Purpose and Objective

Within the context of upcoming ecodesign requirements under the ESPR, this thesis sets out to explore how ecodesign requirements can be used to address some of the mechanics of fast fashion and remove the least durable garments from the EU market to increase the chances of garments having long and active use phase.

The purpose of this thesis project is to stage negotiations centring requirements that can ensure that garments placed on the EU market are long-lived, reusable, and repairable. Based on this collaborative work, we have developed and presented suggestions for concrete requirements. As such, the overall objective of this thesis and its research statement is:

To define ecodesign requirements, which will improve the chances that garments placed on the EU's internal market have a long and continuous active use phase while providing a foundation for negotiations of the final ecodesign requirements for garments.

We have used an actor-network and staging negotiations spaces approach to collaboratively define relevant requirements, as well as relied on an extensive literature search and review to qualify concerns and ideas.

The suggested requirements were combined into a consultation response and will be presented as part of this thesis.

This thesis should be viewed as an extension of the consultation response and offers a thorough insight into the theoretical base of Actor Networks theory complemented by Staging Negotiation Spaces, our applied methodology encapsulating literature review, and the construction of our consultation response as an intermediary object. Be-

sides, we will discuss and reflect on potentials, limitations, and barriers to the suggested ecodesign requirements as well as any potential rebound effects.

This thesis contributes to the field of Sustainable Cities by exploring how relevant requirements under the ESPR can contribute to a narrowing and slowing of the streams of garments currently flooding into our cities, burdening our waste systems, and damaging our shared environment.

## 1.3 Scope and Delimitations

To define relevant ecodesign requirements, we have chosen to focus solely on garments excluding footwear and household textiles, even though these are included in the ESPR's end-use product group *textiles and footwear*.

The thesis primarily centres on use and on factors influential on the length of the use phase. This means that requirements primarily relevant for e.g., resource extraction, production, and end of life, have not been considered. However, we acknowledge that the suggested ecodesign requirements will most likely affect several stages of the life cycle from extraction to end of life. Further research on how the requirements will affect the other life cycle stages is recommended.

The thesis primarily focuses on durability, reliability, reusability, upgradability, and repairability and how these influence the use phase, as these are the product aspects defined under the ESPR.

We do not provide any specific values for the requirements in our consultation response, as the negotiation of these values is a process that goes far beyond this thesis. The purpose is to provide a broad foundation for the development of the final ecodesign requirements for garments.



# 02

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# Thesis Design

This chapter will present the ontological foundation of our project, as well as the theories and methods that have shaped our decisions, analysis, and conclusions. We will explain the vocabulary and frameworks used in this report alongside examples and reflections on how these were used to inform our work.

## 2.1 A Pragmatic Understanding of Knowledge Construction

A pragmatic approach to knowledge construction has informed this project. This means working reflectively and using multiple descriptions and approaches to a problem. This is because the reductive nature of gaining knowledge also means making other areas invisible (Biosvert, 1998; Latour, 1999).

In defining requirements relevant to garment longevity and durability, we have had to consider many approaches to address the diverse factors contributing to the shortening of garment lifetime. In this context, a pragmatic approach was needed to address the problem from many angles.

Existing knowledge relevant to garment production, use, disposal, and requirements, comes from multiple fields of science. As a result, a pragmatic approach has allowed us to move fluidly between scientific fields and methods.

As a philosophical tradition, pragmatism assumes that knowledge is required through actions (Brinkmann, 2006) and therefore requires an active and inquisitive approach to problems. In this context, we have actively instigated and mediated negotiations between multiple stakeholders, which required continuously adopting new knowledge and renegotiating and reframing the problems at hand.

## 2.2 Actor Networks Theory

In this thesis, we have taken an Actor Network approach to identify and understand actors such as the ESPR in relation to garments and how these relations contribute to or prevent prolonged and active use of garments.

Actor Network Theory (ANT) addresses human and non-human actors through a principle of generalized symmetry, i.e., the principle that all actors (human or non-human) should be described with the same vocabulary (Callon, 1986) and therefore have equal potential to act and evoke change in the network. This has allowed us to view inherent garment characteristics as actors with agency that, when changed or modified, also transforms surrounding actors.

At its core, ANT concerns itself with *actors* and what these actors do in relation to each other “*by looking at what entities become, do and produce when they are associated together*” (Storni, 2015, p. 196). By investigating human and non-human actors and how they negotiate and renegotiate networks of relations, we can see how manufacturers, designers, and EU regulations influence each other through moves to continuously construct and deconstruct the roles, meanings and practices which uphold the network. Through the lens of ANT, we have understood the current moment wherein new and radically different relational networks are emerging around garments as actors seek to influence and prepare for ecodesign requirements and all this entrapment. The negotiations and the concerns they represent will set the stage for future relational networks and the practices and meanings that uphold them.

To describe how relational networks are constructed and changed, Callon (1986) proposes the concept of four moments of translation: Problematization, interessement, enrollment, and mobilization. The concept of translation acknowledges that network-building requires actors from different disciplines, with different modes of communication and understandings of the world, to come together. In other words, actors speak different languages and must make themselves and their concerns understood through imperfect processes of translation



to create alignments and allegiances between actors. Through these translations, new networks form (Callon, 1986; Latour, 2005). If translations fail, it is because concerns were not understood or could not be aligned with other concerns, and the emerging network also destroys. In Callon's four moments of translation, actors are identified, and roles are formulated and assigned (Problematization). Actors are invited to negotiate the assigned roles, associated meanings, and concerns (interessement). If interessement is successful, concerns are aligned, and actors assume their roles in the network (enrollment) and begin working actively for the network through moves to interest and enrol new actors (mobilization) (Callon, 1986).

This process of translation happens simultaneously across multiple relational networks and is not necessarily linear. Therefore, networks cannot be viewed as static but in constant flux or 'emergent' as actors align and dis-align as they try to balance several concerns simultaneously. ANT vocabulary is helpful in understanding and describing how these complex networks form or, alternately, why they fail to form. It allows us to ask things like *What roles were negotiated and what concern was the network trying to solve? What maps were drawn and used to translate? Who was included or excluded in these negotiations?* These considerations were vital as we embarked on our own negotiations around what requirements to include or exclude and whose concerns to represent in our consultation response.

In the context of ecodesign requirements for garments, ANT and four moments of translation have allowed us to critically view current EU documents and our consultation response as actors capable of enacting change. Furthermore, it allowed us to identify and make visible actors like 'sizing information', which had (when this project began) not been prominently represented in the negotiations over ESPR.

Callon's (1991) concept of inscriptions and intermediaries was central to this project in terms of constructing the consultation response as an intermediary object. Documents can be actors in themselves, pushing words, phrases, ideas and concepts that other actors can organize formal and informal networks around (Callon, 1991). However, they are also intermediaries in which the author has inscribed injunctions to act (Callon, 1991). This means that objects (like texts) carry concerns, ideas and messages and can transform those relations it meets and provoke actions. An example of such an intermediary is the EU's Call for Evidence on the framework for ESPR (European Commission, 2023), which has spurred hundreds of actors to inscribe and circulate their concerns. As we constructed suggestions for specific ecodesign requirements for garments under the ESPR, we inscribed those concerns that had been translated to us through academic literature and conversations with concerned actors. In doing so, we created our own intermediary that could be circulated and (hopefully) be an injunction for others to act.

Lastly is Callon's (1986) concept of representation, which has not been used prominently in this project but has informed our decisions when selecting what actors we were interested in engaging and mobilizing, as well as being critical of the tools through which these actors speak. Representation is essential because non-human actors do not have articulate voices to speak with. They may *act* and cause human actors to act in response, but they often need a spokesperson or a tool to speak through when negotiations take place (Callon, 1986). The classic example of this is nature, which has caused us all to act in response to the changing climate, but which we can only understand through charts mapping CO<sub>2</sub> in the atmosphere or microplastics in our oceans. When we engage in negotiations about garment use and how to narrow garment consumption, it is important that those actors that cannot

speak for themselves are represented. Likewise, is it essential to be critical of those representations, as we will be in chapter 09, as the tools we use to translate non-human concerns (e.g., environmental impacts through LCA's or garment durability through outlined ecodesign requirements) are imperfect and may be misrepresenting or only partially translating a larger concern.

Based on all this, Actor network theory has informed all aspects of our project. Through an ANT approach, we could identify, describe, and represent relevant human and non-human actors in our consultation response, as well as understand how these non-human actors play crucial roles in garment use practices and what types of ecodesign requirements might disrupt these.

## 2.3 The Staging Negotiations framework

To establish negotiations on what ecodesign requirements should be considered to enable an extended use phase of garments, we have drawn on Pedersen's (2020) framework *Staging Negotiation Spaces* (SNS).

Pedersen's framework builds on the vocabulary and analytical insights of ANT and is formed by three main aspects presented in Figure 2.



Figure 2: The three main aspects of the Staging negotiation spaces Framework. Own illustration.

Pedersen (2020) describes the three main aspects presented above as ongoing processes performed iteratively throughout a design process. From March to May, we circulated the consultation response between actors to stage negotiations on ecodesign requirements for enabling garments to have an extending use phase, reframing it between each circulation.

We expect the staging, negotiation, and reframing processes to continue in the Ecodesign forums on textiles, as the content of the consultation response will persistently be an intermediary result of negotiations until the day product specific ecodesign requirements under the ecodesign directive are set for garments.

For this thesis, staging has involved; interpreting the Call for Evidence on the ESPR; defining stakeholders to be involved in developing the consultation response; and designing and inscribing the consultation response to represent, translate, and mediate minimum requirements on garments.

Objects with the characteristics to represent, translate, and mediate are defined by Vinck

and Jeantet (1995) as intermediary objects. In this context, the term *intermediary* stresses that the object is an intermediary result of a process, as it circulates between actors.

When designed correctly, intermediary objects can become operators of transformations and relative enrolments (Vinck & Jeantet, 1995). Due to their inherent qualities, intermediary objects are an essential part of the staging aspect of SNS.

For this thesis, we orchestrated negotiations by circulating the consultation response between relevant actors to mediate and translate their relations to minimum requirements for garments. A premise for the negotiations is not necessarily to find consensus but to explore possibilities and seek out where actors might find alignment (Pedersen, 2020).

After each circulation, the mediation manifested change in the state of relations, and we inscribed these changes into the consultation response to reflect these insights. Ultimately slightly reframing it according to the translations and further circulation. The negotiations from these circulations are elaborated on in Chapter 6.

### **Understanding space in the SNS framework**

The notion of space in the SNS framework does not refer to a physical space. Pedersen (2020) defines space as the sensitivity towards the frame or limits to what can be addressed in the negotiation, and under which circumstances the negotiation takes place. Thus, space can be seen as the boundaries within the negotiation take place. The space of negotiation for this thesis is thoroughly outlined in Chapter 3.

By using ANT concepts such as translation, inscription, and intermediary objects, SNS lends itself well to describing the role of ob-

jects and their ability to mediate in negotiations (Pedersen, 2020). Thus, it has allowed us to understand, design and inscribe the consultation response as an object to translate and mediate negotiations on ecodesign requirements to enable an extended active use phase for garments.

Finally, the SNS framework has enabled us to construct the consultation response to facilitate negotiations by becoming a mediator between stakeholders.

## **2.4 The Concept of Circular Economy**

From our background as design engineers in sustainability, we have been taught Circular Economy (CE) as a system regenerative by design. However, CE has become incredibly popular and is defined in numerous ways (Kirchherr et al., 2017). In 2015 the European Commission defined CE in *Closing the Loop - An EU action plan for the Circular Economy* as a concept:

*“Where the value of products, materials and resources is maintained in the economy for as long as possible, and the generation of wasted minimized, is an essential contribution to the EU’s efforts to develop a sustainable, low carbon resource efficient and competitive economy”* (European Commission, 2015a, p. 2)

This definition has manifested itself in later policy documents and is well suited for political realities as it frames a strategy for economic growth (Brandão et al., 2020).

In the *New Circular Economy Action Plan* from 2020, the Commission added that:

*“EU needs to accelerate the transition towards a regenerative growth model that gives back to the planet more than it takes, advance towards keeping its resource consumption within planetary boundaries, and*

therefore strive to reduce its consumption footprint and double its circular material use rate in the coming decade”(European Commission, 2020a, p. 2).

Thereby the Commission expanded the definition to encapsulate limits of the economy based on biophysical conditions acknowledging infinite resources are not available. Therefore, this add-on is essential for understanding the room for actions within CE as defined by the EU.

These definitions are thus a considerable part of framing the boundaries of possibilities wherein the minimum requirements can be formed. They are part of making up the nonphysical space wherein the negotiations can take place.

To make CE more actionable, Bocken et al. (2016) present three ways to move from a linear to a circular economy: slowing, closing and narrowing resource loops see Figure 3. As the consultation response aims to set requirements to prolong the lifespan of garments, the requirements are highly linked to the concept of slowing resource loops.

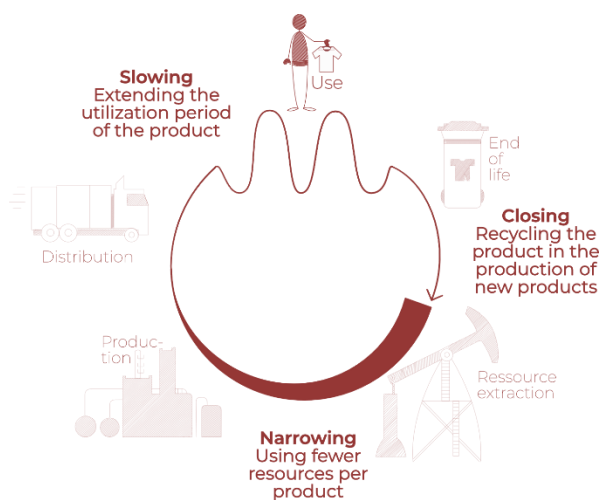


Figure 3: The life cycle stages of a garment is shown in tinted colours starting from resource extraction and ending with end

of life.. In the foreground is the three different resource flows explained in CE: narrowing, slowing, and closing. Highlighted is the life cycle phase use, at this is where this thesis stakes its viewpoint.

Thus, we use CE as a tool for change in the institutions, actor-networks and artefacts forming the current production and consumption systems to slow them down.

The space for negotiating ecodesign requirements forms from the Commission’s definitions of CE and our understanding of the concept. Bocken et al.’s notion of slowing, closing, and narrowing resource loops identifies what type of actions can be suggested within this space.

## 2.5 Ethnographic Field Studies

Ethnographic field studies have enabled us to obtain knowledge on otherwise invisible relations and given us a broader understanding of the industry’s current state. We have used elements of this method to engage in conferences, dialogue meetings and field trips, as illustrated on the timeline in figure 4.

When participating in activities, we have used the method of Participant Observations (Mørck, 2017). This method allows the researcher to observe relations between actors while being aware of their role in the emerging network and access unexpressed and unknown knowledge through observations (Thagaard, 2004). This method was primarily used in the exploratory phase of this project to give us a sense of how retailers approach sustainability in terms of material choices, value propositions and green claims. It has also allowed us to participate in conferences and dialogue meetings and observe the concerns that were said or left out.

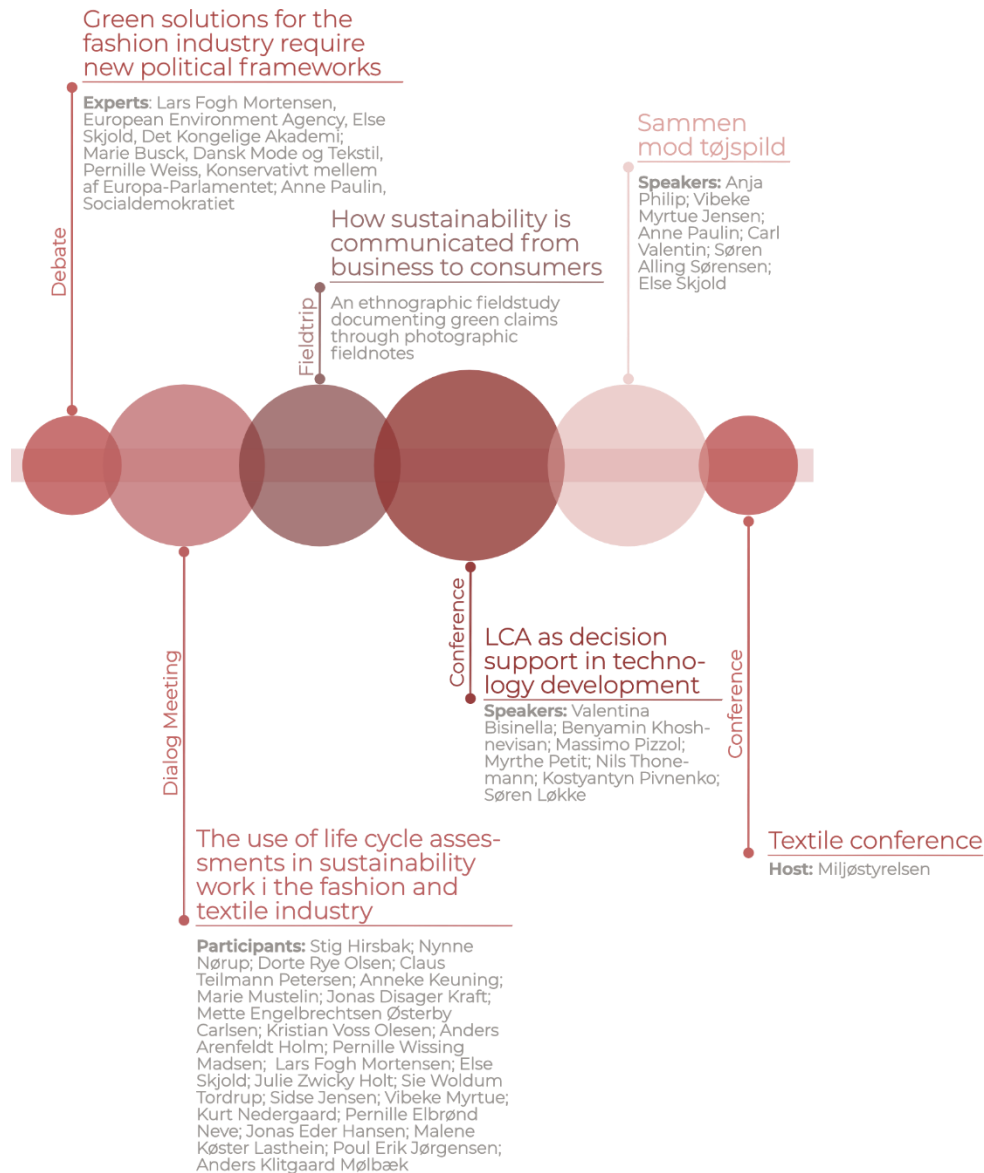


Figure 4: timeline of attended events - own illustration.

## 2.6 Document analysis: Configuring Nonhuman Actors

Asdal and Reinertsen (2022) do not apply ANT or its vocabulary in their introduction to document analysis. However, they describe documents as site-specific, able to stabilize their site and be a site in themselves. Moreover, how sites shape, documents and documents shape sites. They describe documents as relational objects with agency and the

ability to translate actors, intervene in and change their own environments and contexts. This understanding of documents enables analysis and understanding of the relational network a document is part of.

Understanding documents and analysing them through an ANT lens with the understanding of Asdal and Reinertsen, we have been able to unfold how the documents forming the basis of the ESPR are configuring actors in the network. How the ESPR is an actor, and how the Call for Evidence has

agency to develop consensus and agreement on the Commission's future work. The primary analysis of the EU documents, how they contribute to setting the space where negotiations can take place and what concerns they mediate can be found in Chapter 3.

Besides using document analysis in the space analysis, we also used the insights from Asdal and Reinertsen (2022) in our literature review. We viewed each document as an actor with the potential to establish a strong relation to the consultation response by inscribing the reviewed literature's concerns into the response. Thereby inscribing the consultation response to become an operator of a transformation and relative enrolments through strong relations to persuasive actors as academic research.

Understanding documents and analysing them through an ANT lens has been fundamental to create a consultation response with the ability to circulate the network independently, stage negotiations and establish relative enrolment of actors.


## 2.7 Literature Review

Literature reviews have been the backbone of this thesis report. They were conducted first to identify and define relevant factors for garment durability and longevity and then to qualify these factors with supporting research. Using academic literature, we could inscribe our consultation response with scientific authority and represent the identified factors for *end of use* in our negotiations with actors. Literature review as a method has enabled us to 'stand on the shoulders of others' by identifying previous work and allowin(Grant & Booth, 2009)umination of these (Grant & Booth, 2009).

Our literature search was primarily conducted on EBSCOhost and Scopus databases, supplemented by broader searches

on google scholar. Searches were primarily filtered for peer-reviewed articles. However, we have included reports from governmental and environmental agencies where relevant.

Initial key search words were chosen to centre stages of *use*, ranging from purchase to final disposal. The list of reviewed literature will be presented in Chapter 4. The purpose of this exercise was not to weigh any factor for *end of use* above another but to address each factor equally and to support both new and more commonly suggested requirements with existing research. Further qualification was done through dialogue with experts and the framework of *Staging negotiation spaces*.



# 03

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## Analysis of the Negotiation Space

In this chapter, we will analyse and define the space within which ecodesign requirements can be formulated. We will do this through the eyes of central EU documents and look at what concerns inscribed in them are injunctions to act, and how these draw-up lines for actors to move within.

To write a consultation response addressing garments, we needed an understanding of the space it will operate in. This meant identifying actors and their concerns and analysing how these concerns both shore up and limit what can be addressed within the context of a consultation response. In the following sections, we will primarily look at documents and how these nonhuman actors, individually and in combination with each other, frame the operating space in question.

The first framing, however, is one we did by addressing solely garments as a subcategory of textiles. Secondly, we have focused on factors relevant to the life cycle stage, defined as the *use phase*, meaning the time from purchase to disposal. These decisions have allowed us to differentiate and only include concerns relevant to garments' use.

### 3.1 The European Role in Framing the Space for Negotiation

Designing network transformations and artefacts meant to provoke the realignment of networks, the practices and concerns that uphold them, is inherently political work (Storni, 2015). The consultation response enters a network highly influenced by actors exceedingly subjective to the European political agenda. Therefore, understanding the political work is important when 'designing' a consultation response meant to act in this space of existing EU documents and the network around these. The framing of the space for our consultation response is exceedingly subjective to the European political agenda.

The following section will, as a result: 1) outline the most relevant political agendas as they are presented in relevant documents; 2) highlight what types of concerns can be addressed in the response and; 3) present the

circumstances under which the concerns can be addressed.

#### **From the European Green Deal to the ESPR**

In December 2019, the European Green Deal was presented - A roadmap for making the EU's economy sustainable, covering all sectors of the economy (European Commission, 2019). The Green Deal should be understood as a central nonhuman actor in the network, as it has forced all subsequent EU actions and policies to align with or contribute to the Green Deal's ambitions about making EU growth sustainable with respect to biophysical boundaries (European Commission, 2019).

One of the main objectives of the Green Deal is to transition the EU to Circular Economy (CE). In March 2020, the *New Industrial Strategy for Europe (IS)* and the *New Circular Economy Action Plan (CEAP)* were introduced as actors to support the objectives of the Green Deal.

In CE and the ESPR context, the IS aims to incentivise the EU industries to revolutionise production patterns and ensure cleaner and more competitive industries (European Commission, 2020b). In 2021, an update to the Strategy was published in light of Covid-19 (European Commission, 2021).

The IS also refers to CEAP, which puts forward measures, to allow the EU's industry to seize the opportunities to revolutionise their production (European Commission, 2020b). CEAP is a legislative initiative that aims to widen the Ecodesign Directive beyond energy-related products (European Commission, 2020a).

Moreover, CEAP and the IS identify textiles as a critical product value chain with comprehensive and urgent sustainability challenges (European Commission, 2020a, 2021). CEAP and the IS are central actors in our framing.



They specifically problematise textiles as a pollution source and push this concern onto industries and production as actors that must realign themselves to the EU's CE agenda.

In response to the challenges of the textile industry, the Commission also presented the *EU Strategy for Sustainable and Circular Textiles* (SSCT) (European Commission, 2022f).

The SSCT aims to create a coherent framework to make fast fashion out of fashion (European Commission, 2022f). One of its key actions is introducing mandatory ecodesign requirements (European Commission, 2022f). By developing binding product-specific ecodesign requirements to increase textiles' performance in terms of durability, reusability and reparability, the Commission aims to extend the life of textile products, arguing it is the most effective way of significantly reducing their impact on the climate and the environment (European Commission, 2022f, p. 4).

In the CEAP and SSCT documents, the materiality of textiles and textile life (and thereby garments) becomes sites of specific concern. The textile products need to be "...fit for circularity" (European Commission, 2020a, p. 10), problematising all actors that engage with the textile itself: the fibre, fabric, the seams, the manufacturers of these, the designer and the retailer, the consumer who washes and wears it, the plant that sorts and recycles it and so on. By suggesting changes to the materiality of a garment, the entire supply chain and surrounding network are threatened with destabilisation.

The *proposal for establishing a framework for setting ecodesign requirements for sustainable products and repealing Directive 2009/125/EC* – (the ESPR) - Also has the European Green Deal as its bedrock and builds on the IS and CEAP. The ESPR document is vital for the network because it further defines

how the networks may be destabilised. Signs of this destabilisation can be seen in the current industry and public activities as they realign, stabilise and create new networks.

The SSCT is also central for this thesis since these new concerns and potential for destabilisation create a need for new ideas, innovation and input that can successfully align actors with the concerns laid out in CEAP, the IS, SSCT and ultimately, the Green Deal.

Suppose a consultation response containing ideas to combat these new concerns is to gain agency in this network. In that case, it must subsequently establish strong relations with the European Green Deal's CE ambitions, the IS, CEAP and SSCT to fit within that defined space.

An overview of the central actors influencing the ESPR is outlined in Figure 5.

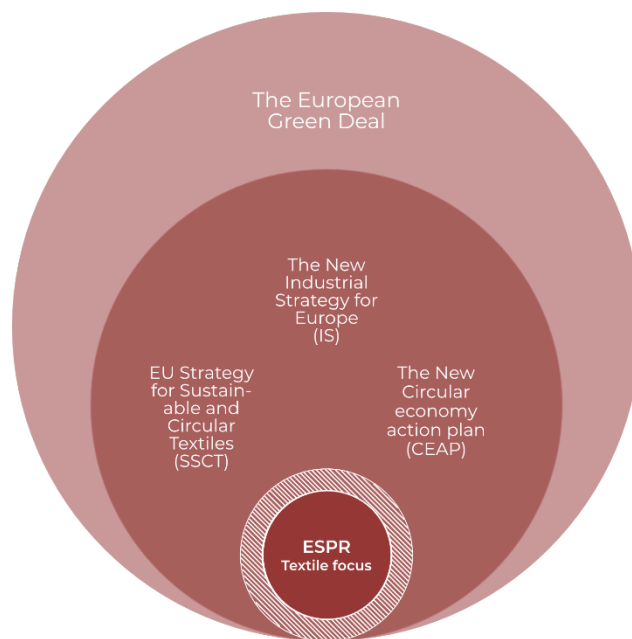


Figure 5: Own illustration outlining the actors who set the conditions for what concerns can be negotiated under the ESPR.

The Green Deal, IS, CEAP, and SSCT fundamentally frame the 'space' for addressing concerns in the consultation response. If we want the consultation response to successfully move through the network, it should be

written within the space of the Green Deals objectives to transform the EU into a circular economy: By supporting the revolution of the textile industry's production patterns and boosting the supply of and demand for sustainable goods and at the same time, making fast fashion out of fashion and extending the lifespan of textiles based on the sustainability and circularity aspects of CEAP, through the instrument of ecodesign requirements under the ESPR.

### 3.2 The Frame and Limits of the ESPR

Now that we understand the outer limits of the navigational space, we can move on to mapping how the ESPR further delimitates the space for the pushing of ideas and how to navigate these.

The philosophy behind the Ecodesign Directive is to set minimum requirements for energy-related products to eliminate the worst-performing products from the market.

The ESPR broadens the scope of the Ecodesign Directive beyond energy-related products (European Commission, 2022d). Hence, the ESPR will set requirements where existing ecodesign legislation does not or is insufficient in addressing environmental sustainability aspects (European Commission, 2022d).

To understand the frame and limits of the ESPR, we turn to Article 2 on definitions and focus on points 7-9.

*"(7) 'Ecodesign requirement' means a performance requirement or an information requirement aimed at making a product more environmentally sustainable;*

*(8) 'Performance requirement' means a quantitative or non-quantitative requirement for or in relation to a product to achieve a certain performance level in relation to a product parameter referred to in Annex I;*

*(9) 'Information requirement' means an obligation for a product to be accompanied by information as specified in Article 7(2)" (European Commission, 2022a, p. 45).*

Moreover, Articles 6 and 7 outline detailed insights into what performance and information requirements should entail.

The ESPR thereby clearly defines what an ecodesign requirement can be. They can be either a performance or an information requirement and must seek to reduce a product's environmental impact. Furthermore, the requirements can be product-specific or horizontal (relevant for a broad range of products).

The ESPR's Article 5 Paragraph 1 also establishes what product aspects an ecodesign requirement should seek to improve. As this thesis has a central focus on prolonging the use phase of garments, the most relevant product aspects from Article 5 Paragraph 1 are points a to e;

- (a) durability;*
- (b) reliability;*
- (c) reusability;*
- (d) upgradability;*
- (e) reparability;*

(European Commission, 2022d, p. 49)

Preferably, any suggested ecodesign requirement should indicate if it is a performance or information requirement and how it relates to the product aspects: durability, reliability, reusability, upgradability, and reparability. ESPR also provides individual definitions for these product aspects, and using these terms in a consultation response

should, therefore, either align with the EU's definitions or clearly state how they are used differently.

### The Frame and Limits of the Call for Evidence

With an understanding of the space framed by The Green Deal, the SSCT, the IS, CEAP and the ESPR concerning the scope of this thesis, we can finally define the last frame relevant to our space: The Call for Evidence, referred to here as CFE.

The Call for Evidence — which can be found in Appendix A — seeks feedback in several areas, one being *"the most relevant aspect(s), per product/horizontal measure, to tackle under the ESPR"* (European Commission, 2023, p. 2). The CFE is the vehicle for our consultation response and this thesis. It is,

therefore, also a part of the framing and limiting the space for negotiations on ecodesign requirements for increasing garments' chances of a prolonged use phase.

The CFE suggests twelve end-use products potentially suitable for first action under the ESPR, one of which is *Textiles and Footwear* — an extensive product category ranging from hats and t-shirts to couch covers and rain boots. A consultation response covering all these subcategories is outside of our scope. Therefore, limiting the consultation response to garments has been necessary.

The CFE introduces several additional non-human actors (Figure 6) in the form of supporting documents that shore up or elaborate on the concerns laid out by the EU's framing documents.



Figure 6: Illustrating all the documents referred to by the Call for Evidence and hence essential for fitting inside the space of the Call for Evidence. Own illustration.

In the Explanatory Memorandum of the ESPR proposal, it is, e.g. noted that product requirements *"should help achieve the objectives and be in line with other measures on key value chains defined in the implementation of the CEAP, such as the EU strategy for sustainable and circular textiles"* (European Commission, 2022d, p. 4).

Textile products were moreover found to have the most potential for improvement through work to increase product durability in the JRC preliminary study (Palma et al., 2023). This is significant because it pushes textiles into the forefront and provides credibility to actors concerned with the durability of garments and not just recycling or the continued economic acceleration through 'closed loops'.

The Impact Assessment's part 1/4 accompanying the ESPR Proposal also suggests an extension of the scope of the current Ecodesign Directive to include textiles, among other product groups (European Commission, 2022b). Part 4/4 of the impact assessment moreover highlights textiles as a priority category while stressing that no EU instrument currently addresses the product-level sustainability dimensions of textiles (European Commission, 2022c). It underlines the need for ecodesign requirements.

All the actors surrounding the Call for Evidence become actors that can give our consultation response agency if it manages to present ecodesign requirements aligned with their negotiation space.

### 3.3 Chapter Conclusion

The negotiation space for a consultation response addressing garments under the ESPR must be actionable within the space defined by the Green Deal, the SSCT, the IS, CEAP and the CFE. Central is the Green Deal's objective to transform the EU into a circular economy by supporting the revolution of the textile industry's production patterns and boosting the supply and demand for sustainable goods and making fast fashion out of fashion, extending the lifespan of textiles based on the sustainability and circularity aspects in CEAP, through the instrument of ecodesign requirements under the ESPR.

These ecodesign requirements must be structured as informational or performance requirements and relate to the product aspects, durability, reliability, reusability, upgradability, and reparability defined by the ESPR.

The Green Deal and its supporting documents are significant actors as they have problematised the fundamental practices upholding the current networks of fast fashion. By setting the space for ecodesign requirements that may change the materiality of the product themselves (and thereby affect how they are made, used and discarded), the documents threaten a destabilisation of existing network structures and even the very presence of some actors in the network. CFE presents a window for actors to express their concern with this destabilisation and suggest ways to create alignment more favourably with the Green Deal's objectives. In Figure 7 you find a visualization of the actors defining the space and the consultation response must position itself according to.

While a consultation response is first and foremost intended for the EU Commission, any suggested requirement will potentially impact many of these network actors. Defining any requirement should, therefore, not

be the purview of any one actor but a collaborative effort wherein selected concerns are represented.

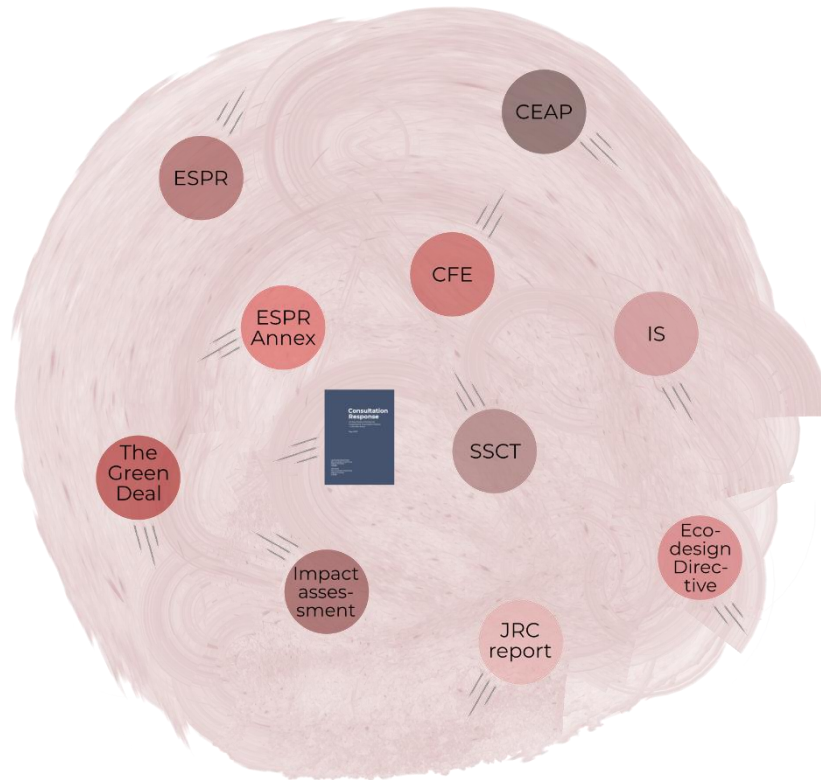


Figure 7: A visualisation of the space for negotiations. Here nonhuman actors in the form of EU policies are constantly positioning themselves in relation to each other and outside actors, hence their relations are of a dynamic nature. So are the relations of the consultation response navigating the space for negotiations. Own illustration.

A vibrant outdoor clothing market scene. In the foreground, several racks of colorful, patterned clothing are displayed. People are seen browsing and interacting with the items. In the background, a large, multi-story brick building with many windows is visible. The scene is set on a paved area, possibly a street or plaza, with trees and other market stalls in the distance.

# 04

## Literature Review

In this chapter, we will present the background and high-level findings of factors for end of use identified through a literature review. Through this work, new non-human actors relevant to use and disposal practices were identified and redefined into an initial list of performance and information requirements.

## 4.1 Preliminary Literature Review

With the space for negotiation appropriately framed, we can move on to our literature review, in which we will identify factors that may allow garments to achieve long use-phases. These factors are subsequently relevant for slowing the resource flows and potentially reducing garments' environmental impact.

Our consultation response aims to advise how ecodesign requirements under the ESPR can be used to make garments suited for prolonged and active use. The term 'active use' is essential because garments that lay dormant in closets or warehouses are 'wasted' in that new or existing clothes are replacing them and do not serve the function they were created for, i.e. being worn. Therefore, our literature review's core has been identifying factors that end use.

### Understanding the ESPR's product aspects, durability and reliability

How the ESPR defines product aspects has been critical in reviewing our selected literature and identifying relevant factors.

Notably, the definitions of durability and reliability (see Table 1) are almost identical except for a distinction between the 'ability' to function and the 'probability of functioning without a limiting event'. We can infer that inherent in requirements for reliability is the notion that the garment should function *as expected* while it is used and for as long as expected.

Table 1: Definitions as written in the ESPR

**"Durability"** means the ability of a product to function as required, under specified conditions of use, maintenance and repair, until a limiting event prevents its

functioning;"(European Commission, 2022d, p. 45)

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**"Reliability"** means the probability that a product functions as required under given conditions for a given duration without a limiting event;" (European Commission, 2022d, p. 45)

The ESPR Annex 1 further elaborates on the aspects of durability and reliability in the context of product parameters:

*"Durability and reliability of the product or its components as expressed through the product's guaranteed lifetime, technical lifetime, mean time between failures, indication of real use information on the product, resistance to stresses or ageing mechanisms;"* (European Commission, 2022a, p. 1).

The aspect definitions and parameters provided by the EU align with traditional definitions of durability, typically understood as a measure of how well attributes formed in the design and manufacturing phase perform when exposed to use and environments (Cooper et al., 2015). However, it is relevant to address the fact that there is some friction between the notion of 'long active use', also typically called "longevity", and the notion of 'durability' as defined by the ESPR.

The distinction between factors for 'durability' and factors for 'longevity' is relevant as factors for garment 'longevity' will include things such as gender, age, marital status, income, wardrobe size and storage space etc. (Birtwistle & Moore, 2007; Cooper et al., 2015; Laitala & Klepp, 2020) which are not vested in the materiality of the garment itself, but rather a result of the consumer specific network it enters, i.e., consumer specific meanings, skills, and practices.

While factors addressing durability fit nicely within a 'performance or informational requirement' space, they cannot fully cover the complexity of factors facilitating active use. For this reason, our literature search included the word 'longevity'. Where factors for longevity were not related to any inscribed property in the garment, they were excluded from our compiled list of factors. However, it was important for our work to explore and understand these factors as they directly relate to the active use of garments and should be included wherever feasible.

In reviewing our selected literature, it was therefore relevant to differentiate between factors that could be inscribed onto the product and factors that could not.

The following literature and documents were reviewed for this thesis, and factors relevant to the end of use relevant in relation to setting ecodesign requirements are listed on page 23.

#### **Literature reviewed:**

Bauer, et al. (2018) Potential Ecodesign Requirements for Textiles and Furniture.

Birtwistle, G., & Moore, C. M. (2007). Fashion clothing - Where does it all end up?

Brownbridge., et al. (2018) Fashion misfit: women's dissatisfaction and its implications.

Cooper., et al. (2015) From rag trade to retail: garment failure and the potential for sustainable fashion.

Degenstein, et al. (2020) Impact of physical condition on disposal and end-of-life extension of clothing.

ECOS. (2021). Durable, repairable and mainstream How ecodesign can make our textiles circular Illustration.

Laitala, K., & Klepp, I. G. (2020) What affects garment lifespans? International clothing practices based on a wardrobe survey in China, Germany, Japan, the UK, and the USA.

Laitala, K., Boks, C., & Klepp, I. G. (2015). Making Clothing Last: A Design Approach for Reducing the Environmental Impacts.

McLaren, et al. (2015). Clothing longevity perspectives: exploring consumer expectations, consumption, and use.

Wakes, et al. (2020), Is price an indicator of garment durability and longevity?

Vejen til et tøjforbrug med mindre miljø-og klimaaftryk. [The road to garment consumption with a lower environmental and climate impact] (2023), (Forbrugerrådet TÆNK)



### Identified factors relevant for end of use:

- The fabric has pilled
- The fabric is showing wear, such as thinning or fraying
- Seams have broken, or fabric has frayed around seams
- Fasteners such as zippers or buttons fail
- There is colour fading, discolouration
- The garment is prone to tears or staining
- The garment has distorted, stretched, or shrunk in the wash
- The garment 'looks' worn
- The garment is made from uncomfortable materials
- The garment is prone to static electricity
- The garment takes on odours
- Problems with size and fit
- The garment used inappropriate size coding
- Initial and secondary garment price (Some garments may retain value on the secondary market and be reused instead of discarded)
- The garment type, e.g. it, was bought for a 'one-off event.'
- The garment has gone out of fashion
- The garment is hard to style with other garments
- Ease of maintenance

It should be noted that this list of factors does not cover all relevant indirect factors for disposal or garment deterioration, such as, e.g. incorrect laundering, even though it has been identified as a direct cause of fabric deterioration (McLaren et al., 2015). This is because an incorrect laundering practice is not a factor for *the end of use* or necessarily inherent to the garment itself. Instead, it relates to how skilled the person washing the garment is at decoding and performing washing instructions.

If we take a moment to look at this list of factors through an ANT lens, it is suddenly obvious that our literature review has enabled us to understand the destructive ways in which garments can act in relation to use practices. When a garment discolours, it does so because characteristics inherent to the garment react to sweat or to laundry detergents (Laitala et al., 2015). When the garment pilled, it does so because of contact with dirt or with abrasion or because the elastane fibre in the material mix acted differently than the cotton fibre (Cooke, 1985; Ukponmwan et al., 1998). Some of these factors also relate to the consumer and the meanings and skills they employ when interacting with garments: perhaps they used the wrong wash cycle, or they couldn't interpret that brand's size label. By ferreting out these relations we become aware of more actors than just the garment and the consumer. It is these actors we are interested in interrogating and modifying under the ESPR framework — the fibers, the chemicals, and the labels — because it is how these many actors relate to the consumer that contributes to current disposal practices.

For this reason, it was essential to evaluate each identified factor for end of use and look for these actors that may more effectively or appropriately be addressed within ecodesign requirements under the ESPR. To do this, we looked to more literature, as it was through studies on e.g., fibre deterioration that the fibres are given voice.

## 4.2 Selection and Development of Relevant Requirements

Attempts at defining requirements that can address garment failure have been made before. The report by Bauer et al. (2018) and the two reports by ECOS (Botta et al., 2022; ECOS, 2021) are notable. These texts point out specific test methods and standards for assessing textiles' durability, reusability, repairability and recyclability and propose instruments for factors such as pilling, wear and thinning, problems with seams, garment distortion, discolouration and care. Botta et al.'s (2022) report is interesting in that it attempts to formulate measurable requirements for these factors but is met with the need for a defined minimum desired lifespan to measure durability against. This is a salient insight, as any maximum or minimum requirement needs to be benchmarked against how long we, at a minimum, expect a garment to function without signs of wear or failure.

### Care labels

Care labels are pointed to by all these reports as an indirect way of addressing fabric deterioration caused by laundering. Although care labels are widely used in garments globally (in the form of washing instructions), these are not, in fact, mandatory, and may be improved upon through standardisation, clarification of symbols and washing temperatures, as well as guidance on correct care, e.g., removal techniques for pilling, types of laundry detergent etc. Care labels are, however, a limited tool, as purely an information requirement. Research into this topic reveals a limit to how much information can be effectively conveyed in such a format and the staying power of care label information in

the consumer's mind (Shin, 2000). Requirements for care labelling should therefore reflect a conservative approach to the amount of information displayed on the label itself.

Furthermore, simply improving conditions for consumers' laundry practices is not enough to rectify problems caused by washing if the garments in question are prone to deterioration. Improved care labels may be best implemented with minimum requirements that ensure garments can withstand the suggested care, such as directly setting quality standards for pilling, tearing, thinning, distortion, etc., under conditions such as washing.

### Design Problems

Some of the identified factors for *end of use* fall outside the scope of the ESPR, i.e. end of use because of static electricity, odours, garment type, fashion, and ease of styling. These factors are determined (in large part) in the design of the garment and are inherent in the product. However, a problem such as the material taking on odours may be primarily related to a wrong material choice for that garment type than a problem with the fabric itself. The other mentioned factors may be due to relational causes, e.g. static electricity may be related to the atmospheric conditions the garment is in, just as a garment 'going out of fashion' is a problem with fast fashion or with the 'time-specific' design.

While the ESPR should set product-specific requirements that can potentially lower the amounts of garments disposed of prematurely, it should not attempt to rectify factors caused by thoughtless design and bad taste. These design problems for garment longevity may be more effectively addressed through product service systems that incentivise thoughtful and timeless design.

## Size and fit

Size and fit come up in much of the reviewed literature as a significant factor for end of use, notably in a study by Laitala et. Al. (2015) estimates that issues with size and fit make up 10-22% (depending on gender) of disposal reasons. How a human body may change with time and alter a person's relation to a garment falls solidly outside of the ESPR. However, assuming all size and fit issues are the user's fault, not the garment or sizing systems, is wrong. Research into size and fit points to incoherent sizing systems across brands and product lines, contributing to size and fit issues (Kennedy, 2009) and a culture of ordering multiple sizes online (Lynch & Barnes, 2020). While improved size and fit would seem like a problem, the market should solve by itself – for surely it would benefit retailers with fewer returns and product satisfaction – history has proven otherwise. Size systems as we know them today have little to do with actual body measurements and more to do with marketing and brand identity (Kinley, 2009) as well as production. An information requirement for size and fit of garments under the ESPR may be helpful to provide accurate sizing information in a standardised form that consumers can learn to navigate.

## Chemicals

Baur et al. (2018) formulated a requirement limiting or banning harmful chemical contents. Chemicals – or reactions indirectly caused by chemicals – have not been identified as a cause for the end of use. While chemicals in garments can have consequences for recycling processes, such considerations fall outside the scope of this thesis. However, from a use perspective, harmful chemical impact the reliability of the garment, and garments may fail to be safe for use or be unsafe to refurbish or 'upcycle' into other garments. For these reasons, performance and information requirements addressing chemicals should be included under the ESPR and will also be addressed in this thesis.

## The initial list of requirements

Based on these considerations, an initial list of performance and information requirements was formulated (Table 2).

Table 2: The initial list of requirements from an early draft of the consultation response

Potential requirements	Product aspects				
	Dura- bility	Relia- bility	Reus- ability	Up- grada- bility	Repa- rabil- ity
Size labelling of key body measurements disclosed in metric units		X			
Minimum fibre length	X		X		X
Minimum seam and hem length	X		X	X	
Maximum dimensions in % on shrinkage after washing and drying	X	X			
Maximum pilling of x	X	X	X		
Colour fastness, Washing, precipitation, wet and dry rubbing, light/UV exposure	X	X	X		
Care and maintenance labelling	X				X
Maximum % of elastane	X		X	X	X
Minimum tensile strength of seams	X	X	X		



# 05

## Design of the Consultation Response

In this chapter, we describe the deliberate inscription choices we made in the construction of our consultation response as a literary intermediary object, as well as how deliberations over audiences and circulation platforms affected these design choices.

## 5.1 Designing the Consultation Response as an Intermediary Object

The consultation response aims to circulate independently between actors in the network and initiate negotiations on ecodesign requirements for garments. Therefore, we have designed the consultation response to act as an intermediary object: a nonhuman actor who can represent concerns, translate actors and facilitate building knowledge and compromises.

This chapter outlines how we have inscribed – the result of translating one’s interest into material form (Callon, 1991) - the consultation response.

In chapter 6, we will evaluate the inscriptions outlined in this chapter by describing how the consultation response has facilitated knowledge sharing and the building of compromises between actors and present the results from these negotiations.

### A multifaceted audience

The first step of the inscription process was to accurately define the audiences we were interested in inviting into a negotiation space. First and foremost were the recipients behind the Call for Evidence, meaning the document should be inscribed so that its content might translate actors in the EU after it was submitted. However, we were also interested in engaging both academic actors, actors in retail and fast fashion and ordinary citizens, which meant also adding text and ‘catchy text to fit spaces like LinkedIn and Facebook.

### Fitting into the EU universe

Being aware that the consultation response had to fit into the EU universe to gain agency in the network, we scrutinised EU documents related to the ESPR, previously submitted consultation responses, and sought advice from actors operating within the EU

universe every day. The results of these inquiries and how they influenced the inscription of the consultation response is commented upon in the following sections.

With its terminology, instruments and processes, the EU universe has been difficult to grasp as an ordinary citizen fully. Still, also essential to mobilize in negotiations with different audiences. The consultation response, as it has been submitted, will be circulating between employees within the EU Commission – actors subjected to EU vocabulary every day. Therefore, we have been very aware of inscribing the consultation response with a vocabulary that holds the EU terms used in the ESPR to make it relevant and actionable in the space it enters.

At the same time, we have excluded some of the wording from the EU universe to establish relations with outside actors. An example of this is a minimal mention of reducing production volumes as this is a chocker for the industry. This was also done to interest and create possible alignment with actors from the industry.

Additionally, we reviewed consultation responses submitted to previous EU calls for evidence, specifically to learn what format, language and layout were used. We noticed the use of endnotes rather than APA references, which we adopted in our consultation response for the sake of readability (Appendix B).

Besides going through all the documents related to the ESPR and previously submitted consultation responses, we were also in contact with a European Environmental Bureau (EEB) member and one from the European Environment Agency (EEA) to gain insight into how to interest actors through a consultation response. They both emphasized making the suggested requirements as ‘*plug-and-play*’ as possible. As a result of this in-

sight, we designed a layout which would allow the reader to take out the individual requirements, complete with a justification, an indication of whether it is a performance or information requirement, potential means of action (through EU instruments), potential standards/testing methods and what areas are still to be determined – see Table 3.

Another recommendation gained through dialogue with an actor from the EEB was to visually stand out by putting some effort into the layout and building our response on academic research. We perused this by using colours and schematics and generating a front page (Appendix B) for the consultation response. Moreover, to build convincing support, we heavily leaned on currently available research instead of, e.g. interviews. We used the persuasive power of academic research

to lend agency to our suggested requirements.

## 5.2 Chapter Conclusion

In designing the consultation response, we deliberately made inscription choices in vocabulary and layout, so the document could independently circulate between actors in the network and initiate negotiations on ecodesign requirements for garments. This was done to create opportunities for new relational alignments between the human and nonhuman actors that define and move within the space for negotiation. Moreover, the consultation response was simultaneously designed to interest actors within the EU, so that it would fit into the specific networks within the EU where the ESPR itself is being designed as well as interest and enroll actors outside the EU framework.

Table 3: the tabel layout of the consultation response (Brøste & Eriksen, 2023)

Suggested Requirement		
Requirement		
Type of Ecodesign requirement	Performance	Information
Justification		
Potential means of action		
Potential standards/testing methods		
To be determined		



# 06

## Circulation of the consultation response

In the previous chapter, we described the deliberate inscription choices made in the design of the consultation response. In this chapter, we will describe and analyse how these choices were translated through negotiations, iteratively transforming both content and format to reflect or accommodate new concerns.



## 6.1 Results from Circulation Before Publication

It is relevant to evaluate how and if the consultation response has facilitated translation and relative enrolments of actors, as this thesis aims to set the stage for negotiating how to increase garments' chances for a long and continuous active use phase under the ESPR framework. Ultimately, if we have succeeded in translating concerns around the ecodesign requirements for garments through the circulation of our consultation response.

In this chapter, we dive into the results of some negotiations to show how the consultation response has translated and enrolled actors on its way through the network. Likewise, we explore negotiations where only relative alignment and enrollment were achieved, but all actors left the negotiation translated.

The consultation response was circulated multiple times before being uploaded to the Call for Evidence site on the 5<sup>th</sup> of May, 2023. This was done to craft a robust consultation response that can circulate independently in the network, initiate negotiations on ecodesign requirements for garments and facilitate relative enrolment. During these circulations, the respective drafts of the consultation response functioned as an intermediary object between us and the relevant actors. In this process, concerns inscribed in the consultation response were translated and negotiated, resulting in new translations wherein elements of the consultation response were adjusted, expanded or removed. The consultation response has thereby facilitated knowledge sharing and the building of compromises.

The process of circulating the consultation response can be understood as a chain of redesigns through which the initial suggested ecodesign requirements - listed in Table 2 in section 4.2 - were simultaneously validated and abandoned as concerns were translated and inscribed onto the consultation response. Each circulation was a new point of

departure, resulting in 10 revised versions before it was uploaded on May fifth, 2023. This process is illustrated in Figure 8.

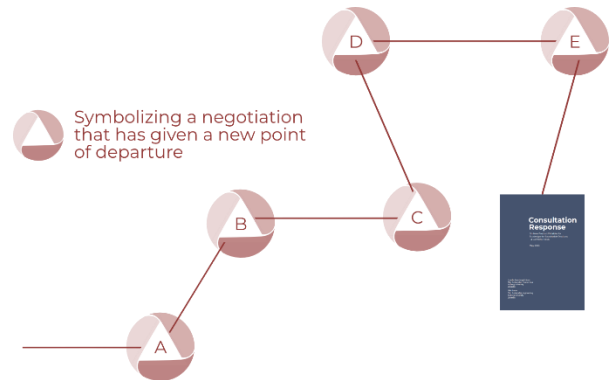


Figure 8: Visualisation of the circulation of the consultation response before submitting it to the Call for Evidence

Each circle represents a negotiation where knowledge sharing and building of compromises take place — eventually resulting in a new point of departure. The outcome of the circulations is listed below in Table 4.

Negotiations centring the consultation response ranged from comments on the form to comments on content, depending on the actor. Notable were concerns expressed by an actor in the EEA, who recommended a 'plug and play' format, which implied that the consultation response should contain as high a level of detail as possible to make it directly actionable. Feedback from an actor with a textile engineering background was vital to validate some requirements' functional utility, such as minimum seam allowance. This requirement would theoretically facilitate repair and make garments adjustable, alleviating fit issues. Still, the additional material would pose severe design issues for products using thick fabrics.

Concerns outside the scope of this thesis were also pushed in these negotiations. For example, information requirements on 'production year' were mentioned as a vital measure point for future data collection. A measurable data point for longevity can improve the accuracy of available data on textiles for future (and present) decision-making. While such a suggestion may not contribute directly to

prolonged use of garments, it feeds into a more extensive debate about the future of fashion and whether current data and methods can validly support it. Moreover, these negotiations outside our scope represent negotiations where only relative alignment and

enrollment were achieved, as concerns outside of our scope (including production year as a requirement) were left out of our response.

Tabel 4: The outcome of the circulations illustrated in Figure 8.

Negotiation	Stakeholders	Takeaways	Comments
A	Lector in design and sustainability at The Royal Academy and researcher in sustainable fibre production at the Royal Academy	Focus more on technical aspects of garments as these are fundamental to enable a long and active use phase	The consultation response at this point only included a requirement to accommodate for size and fit issues.
B	Expert on sustainability and circular economy at EEA	Make it as <i>'plug-and-play'</i> as possible by suggesting potential means of action.	The Commission is short of hands, and therefore, they highly value plug-and-go suggestions.
C	Thesis students at Sustainable Cities	Revised the use of EU terminology and broadened our focus to include both factors for longevity and durability.	To some degree, the consultation response failed as an effective intermediary object, as some of our fellow students found it challenging to comprehend the concerns inscribed due to the use of complex vocabulary.
D	Lector in design and sustainability at Aalborg University	Outline where further investigations are needed and consider how the requirements would differ according to product category.	
E	Clothing designer at the Royal Academy	We removed the requirement concerning seam and hem length.	It comes down to each style whether it would be wise to include an additional length to side seams and hems. For some garments, such as jeans, it would degrade the product to have a standardised performance requirement for side hems (R. Stetter, personal communication, 03.05.2023).

The consultation response was also continuously circulated with our supervisors, Stig Hirsbak, a sustainability, innovation, and politics lecturer at Aalborg University and Nynne Nørup, an assistant professor in sustainability, innovation, and politics at Aalborg University. They provided valuable feedback resulting in multiple reframings between the circulations mentioned above.

All of the circulations have resulted in knowledge sharing and compromises, ultimately resulting in the consultation response uploaded on May 5th, which can be found in Appendix B. The consultation response in Chapter 7 is the revised version resulting from further circulations after the final submission date.

## 6.2 Results from Alignments of Actors

On the 4<sup>th</sup> of May, the EEB circulated their response draft. In the section on textiles in the *response draft* (2023), it is clear how our negotiations with the EEB have contributed to translating and mobilising several concerns—the recommendations of their and our consultation response overlap. Below we present examples of how the continuous negotiations and circulations before the final upload the EU's Call for Evidence site, have resulted in actors being mutually translated and enrolled in providing a foundation for developing the final *ecodesign requirements*.

A central point we have negotiated is that the ESPR should encapsulate product aspects beyond physical durability. We see an apparent overlap and alignment of argumentation in the wording of our consultation response and the EEB's consultation response. The EEB states:

**“... the definition of durability should be expanded to go beyond material aspects of**

**durability and consider all the factors behind the drive to dispose of clothing and purchase new items, which extend beyond the need to replace a product that has reached the end of its physical lifespan and concern the availability of so many new products. Ecodesign requirements should be set with a view to enabling products to remain in continuous active use for as long as they are physically durable”** (European Environmental Bureau, 2023, p. 16)

In the consultation response draft we circulated with the EEB, our wording was:

**“We advocate that Ecodesign requirements should be set equally for emotional and physical durability by dividing the horizontal measure in two, so products remain relevant and in continuous active use for the entirety of their physical duration”** (Appendix C, p. 9)

Besides strongly advising on including factors beyond physical durability, we also see an alignment on the suggested information requirement on sizing in metric units. The EEB note:

**“With one third of disposal reasons connected to the perceived value of garments and the environmental impact of a textile product directly linked to the number of times that product is used, an information requirement could be set that would mandate the provision of information on sizing guides and exact metric measurements used for a particular garment at the point of sale, could ensure that consumers who are unable to try on items before buying are more equipped to choose items which are likely to fit them and that they will get most use of for longer, helping to reduce product returns and disposal. Figures from EURATEX18 show that the amount of textiles and clothing sold online more than doubled since 2009 – and the resulting increase in levels of unsold and returned textile products. This requirement could be considered as a way to build on the suggestion for EU wide harmonised product size measurements**

**through the Textiles Labelling Regulation”**  
(European Environmental Bureau, 2023, p. 16)

This recommendation is very much in alignment with our recommendation from the draft negotiated with the EEB:

**“The current ad hoc size labeling system (s, m L, or 32, 36,..) has no obvious (at least for the consumer) relationship to body measurements and is inconsistent across manufacturers and brands. This leads to size confusion, customer dissatisfaction, and high return rates, and places the consumers in a situation that necessitates trying on garments to ascertain fit. This is untenable, as apparel sales have increasingly moved online, and it is therefore unsurprising that returns of clothes purchased online are significantly higher than the garments purchased in stores, due to the failure to feel and try on the product beforehand. The additional cost to the climate caused by returns and subsequent additional transport and handing are largely unknown due to the opaque nature of the industry but are likely substantial ... To facilitate the purchase of more sustainable garments, manufacturers shall precisely report garment-specific measurements added to, or instead of, the ad-hoc sizing label. Information should be displayed alongside the current size labeling, attached to the garment, or prominently displayed on the e-commerce site, covering:**

- **Key body measurements disclosed in metric units** (Hips, waist, bust, etc.)
- **A pictogram identifying the measurement points to account for style variations”**

(Appendix C, p. 9.)

In addition to the quotes above, the EEB notes that *“Elements to cover in the technical durability requirements include: pilling, tear strength, tensile strength (the maximum strength fabrics can manage without breaking), resistance to stresses or ageing mechanisms, colour fastness, quality of zippers, and*

*minimum durability of function”* (2023, p. 16), many of which are also included in our consultation response.

As an effective intermediary object meant to interest, enroll and mobilize, the consultation response was not a unilateral success. Despite several attempts at contacting relevant actors through email and tagging on LinkedIn, actors from the retail sector did not engage in negotiations (with us). This belies a flaw in the consultation response design, as it perhaps developed both in content matter and format to interest those in the legislative and academic fields.

Finally, the content of the consultation response has persistently been an intermediary result of negotiations. It will continue to be so until the day product-specific ecodesign requirements under the ecodesign directive are set for garments.

## 6.3 Results from The Digital Negotiation Platform

After uploading the consultation response on May 5<sup>th</sup>, days before the Call for Evidence closed, we shared the work via [LinkedIn post](#) -see screenshot 1 on the following page - and several relevant groups on Facebook. Thereby, we made a public digital stage for negotiations on how to increase garments' chances for a long and continuous active use phase through the ESPR framework. In this chapter, we comment on what negotiations and translations came from posting the consultation response publicly.

The following chapter presents a revised edition of the consultation response. The revision results from negotiations facilitated by the consultation response circulating between actors through the digital stage. Through comments and negotiation through TEAMS with a board member of the Union of Con

cerned Researchers in Fashion and an assistant professor in Circular economy, we were left with three main points of criticism

- Critique that the consultation response did not directly address how to reduce volumes
- Critique on accepting 'durability' as 'quality' as a basic premise
- A critique of not addressing how to transform consumption from a consumer perspective

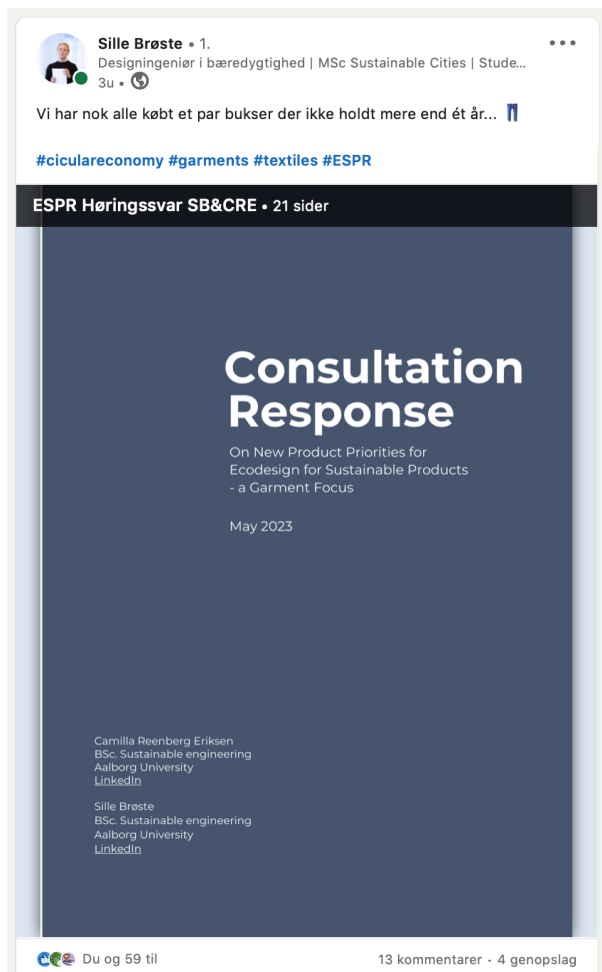
These critique points made it clear that we had to be more precise in the consultation response to frame the space we were giving feedback within. As mentioned, the ecodesign requirement instrument is not optimal for setting requirements, directly reduc-

ing volumes, or influencing consumer behaviour. Information requirements can accommodate a reduction of volumes and change in consumer behaviour but cannot stand alone. Both aspects are fundamental to revolutionising the production and consumption patterns of the textile industry; however, our consultation response focuses on making garments suited for an extended use phase.

The last crucial takeaway from negotiations was to remove vague terms like 'quality', as this could fairly be misconstrued as presuming increased garment lifespan would naturally follow increased durability when current consumption patterns do not support this.

To translate these negotiations into our thesis, we revised the consultation response, focusing on making the space of negotiations transparent and rewriting the parts where durability could be read as a quality.

Screenshot 1: A screenshot of our LinkedIn post



The LinkedIn post was exposed to more than 2.300 actors. In the comment section, we tagged multiple actors we had been in contact with during the development of the consultation response. Other actors tagged relevant actors from their network. Our supervisors and ourselves reposted the consultation response. Besides posting it on LinkedIn, we also posted it in relevant Facebook groups, resulting in additional exposure. The consultation response was, at this time, independently circulating and facilitating negotiations in relevant networks.

This thesis aims to set the stage for negotiations on how to increase garments' chances for a long and continuous active use phase through the ESPR framework. As mentioned in the previous section the content of the consultation response has persistently been an intermediary result of negotiations. It will continue to be so until the day product-specific ecodesign requirements under the ecodesign directive are set for garments. The negotiations we have had on the back of pub-

licly circulating the consultation response validate that the consultation response does indeed independently facilitate negotiations on how to increase garments' chances for a long and continuous active use phase.

As the Call for Evidence is public, we have had the opportunity to read other actors' consultation responses. This has validated that product-specific ecodesign requirements are a subject for extensive and ongoing negotiations due to textiles' level of complexity and industry lobbyism.

## 6.4 Chapter Conclusion

In this chapter, we described how the consultation response was circulated as a transformative intermediary object onto which actors could inscribe their concerns and as a static intermediary, circulating on social internet platforms. Through this process, we can see that an early draft of the consultation response successfully translated and mobilized concerns around garment size and fit to actors in the EBB. The uploaded version was also capable of interestment and facilitating further negotiations with actors in the academic field. However, it did not succeed in interesting fast fashion industry actors, perhaps because of its predominantly academic angle and anti-consumerism concerns.



The

# 07

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## The consultation response

In this chapter, we present the final revised version of our consultation response, which represents the heart of our work and of this thesis. We have included both the front page, table of content and literature list so that the chapter may be circulated separately as an independent document. Within, the reader will find our suggested requirements and specific recommendations for further work related to these.

The published consultation response (Brøste and Eriksen, 2023) was with footnotes, however for coherency with the rest of the thesis the revised edition presented below is with APA references.

# Consultation Response

On New Product Priorities for  
Ecodesign for Sustainable Products  
- A Garment Focus

Revised June 2<sup>nd</sup>, 2023

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# Introduction

Textiles were evaluated in the JRC preliminary study as the group with the highest environmental impact and the most potential for improvement through work to increase product durability (Palma et al., 2023). It is necessary to set strategic requirements under the ESPR for the textiles and the subcategory garments to ensure that garment products placed on the EU market are suited to prolonged and active use by being durable, reliable, reusable, and repairable. Addressing textiles and, subsequently, fast fashion garments with a circular economy focus through the ESPR is an essential step in archiving the objectives of the European Green Deal.

This consultation response to the *Proposal for Ecodesign for Sustainable Products Regulation* (ESPR) aims to provide a research-based starting point for a subsequent Ecodesign forum developing ecodesign requirements for textiles, specifically garments.

Research demonstrates that physical durability and purchase price are significant factors for repair and garment disposal decisions (Wakes et al., 2020). As a result, garments should be produced according to minimum standards so that they do not pill, tear, lose colour, fit as intended, and can be reused, repaired, and upgraded. The goal of ecodesign requirements for garments should be to ensure garments placed on the EU market are suited for a prolonged functional lifespan and increased value and contribute to an overall increase in garments suited for recycling, reducing the amounts of EU-exported textiles that end in landfills.

This document outlines suggestions for ecodesign requirements related to making garments suited for an extended use phase, as the length of the use phase, i.e., how many uses a garment sees before it is disposed of, is a determining factor for the overall environmental impact of garments (Laitala & Klepp, 2020). The suggested requirements are based on existing research on factors for functional garment durability, reuse, repair, and primary reasons for early disposal. Additionally, they support the EU'S strategy to create a greener, more competitive, and resilient textile sector, improving conditions for repair and reuse services and reducing overconsumption, overproduction, and the amounts of discarded or exported textiles.

# Potential Ecodesign Requirements for Garments

This document contains a summary of suggested requirements for garments concerning the product aspects: durability, reliability, reusability, upgradability, and repairability. Followed by a specification of the individual requirements. Each proposed requirement is accompanied by the following:

- An indicator of whether it is a performance or information requirement.
- A justification based on current research
- Potential means of action
- Potential standards/testing methods
- To be determined

## A Summary of Proposed Requirements

The ecodesign requirements suggested in this document outline inherent characteristics that will increase the chances of garments having a prolonged active use phase. In so doing, it sets the bar for garments to retain aesthetic and technical functionality for longer and be better suited for use, reuse, and repair.

The suggested requirements aim at removing the least durable products currently contributing to overconsumption, high replacement frequency, and subsequently higher environmental impacts through increased production and transport as well as waste - from the market.

A minimum expected lifetime, defined by, e.g., the number of uses or washes, should be set for garments as a prerequisite to developing specific thresholds for each requirement to ensure a cohesive and target-based strategy for minimum functional durability across individual ecodesign requirements. By doing so, requirements for fibre length, seam strength, colour fastness etc., can all be benchmarked against the same minimum desired lifetime.

The requirements suggested in this document should not be viewed as an exhaustive list but as an overview of factors relevant to garment durability as indicated by currently available research. A future working group under the Ecodesign Directive should see them as an inspiration or starting point for developing actionable requirements.

The suggested requirements, connected to the ESPR's article 5 product aspects: durability, reliability, reusability, upgradability, and repairability, are in Table 1.

Table 5: List of suggested Ecodesign requirements for garments and their relation to selected article five product aspects

Potential requirements	Product aspects				
	Dura- bility	Relia- bility	Reusa- bility	Upgra- dability	Repa- rability
Size labelling of key body measurements disclosed in metric units		X	X		
Minimum fibre length	X		X		X
Maximum dimensions in % on shrinkage after washing and drying	X	X			
Maximum pilling of x	X	X	X		
Colour fastness, washing, precipitation, wet and dry rubbing, light/UV exposure	X	X	X		
Care and maintenance labelling	X				X
Maximum % of elastane	X		X	X	X
Minimum tensile strength of seams	X	X	X		
Threshold requirements on chemicals harmful to humans and ecosystems		X	X		

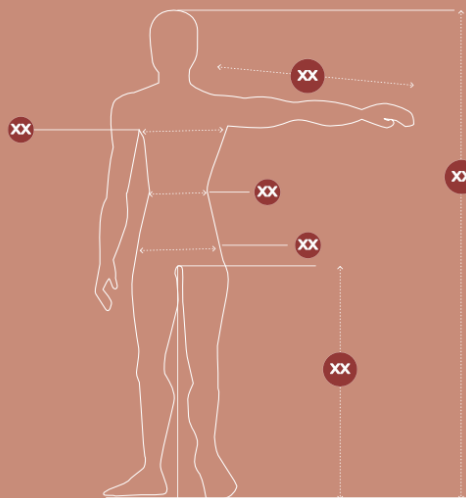
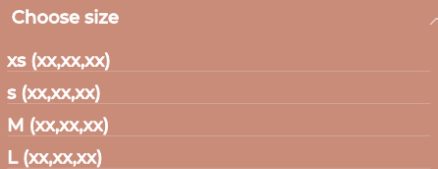
# Description of the Individual Ecodesign Requirements

## Suggested Requirement

### Size labelling of key body measurements disclosed in metric units

Manufacturers shall precisely report garment-specific measurements added to, or instead of, the ad-hoc sizing label. Information should be displayed alongside the current size labelling, attached to the garment, or prominently displayed on the e-commerce site, covering the following:

- Key body measurements disclosed in metric units (Hips, waist, bust, etc.)
- A pictogram identifying the measurement points to account for style variations.



*Own illustration. A suggested example of size labelling with metric measurements and pictogram.*

Research on size labelling shows that these two information points, in combination, equip consumers with clear and understandable information in the purchase situation (Faust & Carrier, 2009).

Type of Ecode-sign requirement	Performance	Information
		x
Justification		

	<p>The current ad hoc size labelling system (s, m, L, or 32, 36,..) has no apparent (at least for the consumer) relationship to body measurements and is inconsistent across manufacturers and brands. This leads to size confusion, customer dissatisfaction, and high return rates (Cynthia, 1993; Kennedy, 2009; Kinley, 2009) and places the consumers in a situation that necessitates trying on garments to ascertain fit. This is untenable, as apparel sales have increasingly moved online. Therefore, it is unsurprising that returns of garments purchased online are significantly higher than those purchased in stores due to the failure to feel and try on the product beforehand (European Environment Agency, 2021). The additional cost to the climate caused by returns and subsequent additional transport and handling are largely unknown due to the opaque nature of the industry (European Environment Agency, 2021) but are likely substantial.</p> <p>By making exact garment measurements a mandatory information requirement, consumers will be provided with relevant information on fit and sizing before purchasing the product, facilitating the choice of more sustainable garments.</p>	
<b>Potential means of action</b>	Textile Labelling Regulation (European Parliament & European Council, 2011)	A size labelling requirement should be implemented as part of the planned review of the textile labelling regulation (European Commission, 2022f)
<b>Potential standards/testing methods</b>		
<b>To be determined</b>	<p>Identify the most relevant and easily understandable measurement points to communicate in the size label.</p> <p>Whether the label should communicate stretch, e.g. knitted and woven garments stretch differently, and size will therefore be less significant in knitted garments.</p>	

## Suggested Requirement

### Minimum fibre length

Manufacturers shall comply with a minimum fibre length for natural fibres, where thresholds are differentiated according to fibre type and product.

Type of Ecodesign requirement	Performance	Information
		<b>x</b>
<b>Justification</b>	<p>A minimum requirement on fibre length can prolong garment lifespan, as the fibre length is one of the most important properties for fibre quality, being a critical characteristic in the processing of fibres and yarns and the translation of fibre strength to yarn strength (Dai &amp; Li, 2006b). Short fibres are difficult to process into yarn, cannot withstand wear and tear over a prolonged period causing high disposal rates, and are unfit for textile-to-textile recycling. Longer fibre lengths are thus preferable and can prolong clothing durability and enhance reusability and upgradability.</p>	
<b>Potential means of action</b>	Extended producer responsibility	An eco-modulated fee under the EPR can complement the requirement.
<b>Potential standards/testing methods</b>	<p>Wool: ISO 920:1976 (The International Organization for Standardization, n.d.-a)</p> <p>ISO 6989:1981(en) (The International Organization for Standardization, n.d.-c)</p>	
<b>To be determined</b>	<p>The length of different fibres offers different functional possibilities; therefore, thresholds should be made according to relevant product categories.</p> <p>The trade-off between the durability of long fibre lengths and the energy and resources required to produce these should be examined and evaluated according to the individual fibres before thresholds are set.</p> <p>The minimum requirement threshold may be set according to the preferred length of fibres for recycling.</p>	

## Suggested Requirement

Maximum allowed dimensional change in %  
 Garments should perform within a maximum % of shrinking or other dimensional changes after the first wash performed according to care label instructions.

Type of Ecode-sign requirement	Performance	Information
	<b>x</b>	
<b>Justification</b>	<p>When dimensions of clothing change, it often results in an inadequate fit and becomes a reason for discarding or not using textiles (Laitala et al., 2015). Setting a requirement for maximum shrinkage after washing and drying will increase the probability that the product functions as required under given wash and care instructions, increasing product reliability. Furthermore, it will minimise the probability of clothing becoming premature waste and enhance the product's durability (ECOS, 2021).</p>	
<b>Potential means of action</b>	Extended producer responsibility	An eco-modulated fee under the EPR can complement the requirement.
<b>Potential standards/testing methods</b>	Standard ISO 5077	Bauer, B. et al. and ECOS (2023) suggest the standard as a testing /documentation option.
<b>To be determined</b>	<p>The shrinkage may depend on the fabric or other product-specific characteristics, e.g., hydrophilic fibres tend to shrink more than hydrophobic fibres (Binjie &amp; Hu, 2008). Therefore, meaningful product groups and threshold values should be identified, possibly resulting in multiple thresholds depending on the identified characteristics.</p>	



## Suggested Requirement

### Minimum resistance to pilling

"Fabrics shall resist pilling of a minimum of  $x$  (test score)" (Bauer et al., 2018, p. 38), according to standards testing pilling. Fabric types (knitwear, woven and non-woven etc.) should differentiate score thresholds.

Type of Ecode-sign requirement	Performance	Information
	$x$	
<b>Justification</b>	<p>Laitala et al.'s study found that 3% of garment disposal cases were caused by pilling and a further 7% because the garments looked 'worn out' (Laitala et al., 2015). In Cooper et al. study on garment failure, 55% of discarded garments showed signs of pilling (Cooper et al., 2015).</p> <p>Pilling on fabric surfaces results in the degradation of appearance and can result from several interrelated factors such as fibre type, length and fineness of fibres, the weight of the final fabric product, or the manufacturing method for the fabric (Ukponmwan et al., 1998) and different testing methods for different materials may therefore be appropriate. Pilling occurs when fabrics are worn and washed (Cooke, 1985) (i.e., in the use phase) and is a cause of textile disposal.</p> <p>Pilling is especially problematic for synthetic fibres, synthetic fibre blends, knitwear (Ukponmwan et al., 1998) and garments with recycled fibres. Therefore, a requirement for maximum pilling should be differentiated by fabric type.</p>	
<b>Potential means of action</b>	<p>Extended producer responsibility</p> <p>Digital Product Passport</p>	<p>An eco-modulated fee under the EPR can complement the requirement.</p> <p>The information should be available in the Digital Product Passport as it influences the possibilities for recycling.</p>
<b>Potential standards/testing methods</b>	<p>ISO 12945-1:2020(en)</p> <p>ISO 12945-2:2020(en)</p>	<p>Bauer et al., 2018 and ECOS, 2022 suggest the standard as a testing /documentation option.</p>
<b>To be determined</b>	<p>The characteristics determining the extent of pilling should be identified for individual fabric types, and thresholds should be set from these.</p>	

## Suggested Requirement

### Colour fastness to washing, precipitation, wet and dry rubbing, light/UV exposure.

Fabrics should perform according to set standards for minimum colour fastness when exposed to washing, precipitation, wet and dry rubbing, and light/UV exposure

Type of Ecode-sign requirement	Performance	Information
	<b>x</b>	
<b>Justification</b>	<p>By setting minimum product requirements for colour fastness, textiles may retain their functional and technical durability for longer, increasing reusability.</p> <p>In a survey by Laitala et al., colour change and staining were indicated to cause 11% of clothing disposal cases and bleeding from other garments for a further 2%(Laitala et al., 2015). Research done on garment failures in discarded garments found that 70% of disposed garments that had been deemed 'not fit for purpose' showed signs of colour-related problems, most commonly colour fading (55%), issues with logos (16%) and discoloration (15%) (Cooper et al., 2015), indicating that colour related problems are a primary reason for garment failure and subsequent exit from primary or second-hand use.</p>	
<b>Potential means of action</b>		
<b>Potential standards/testing methods</b>	<p>Washing: Standard ISO 105 C06</p> <p>Precipitation: Standard ISO 105 E04</p> <p>Dry rubbing and light: Standard ISO 105 B02</p> <p>Wet rubbing: Standard ISO 105 X12</p>	<p>Bauer B. et al. suggest the standard as a testing /documentation option (Bauer et al., 2018).</p>
<b>To be determined</b>	<p>As colour fastness depends on the molecular structure of the dye, fibre type, dyeing process, and depth of colour (Annis, 2012) it is vital to identify meaningful product categories when defining relevant threshold values for colour fastness. Synthetic fibres typically hold colour better than natural fibres, so thresholds should be set to reflect fibre properties, so they do not unintentionally favour synthetics.</p>	

The different characteristics of individual colours should be investigated and considered according to the separate exposures and following thresholds. E.g. Bauer B. et al. suggest the threshold for colour could be stricter for dark colours (Bauer et al., 2018).

Relevant product groups should be identified so garments that are, e.g., neither dyed nor printed are excluded from the requirements.

Garments close to the skin should be identified and classified to make relevant requirements regarding colour fastness to perspiration.

## Suggested Requirement

### Care and maintenance labelling

Mandatory garment-specific care and maintenance instructions covering:

A pictogram of:

- Appropriate washing, drying, and ironing methods
- Maximum temperature during washing and drying
- Maximum centrifugation
- Description of, or link to, relevant maintenance instructions on pill removal, stain removal, repair services etc.

Information should be attached to the garment.

Type of Ecodesign requirement	Performance	Information
<b>Justification</b>		<b>x</b>

Currently, garments do not need to carry a care and maintenance label (Textile Label, 2023). However, how well textiles are cared for and maintained impacts the product's lifetime.

Washing, bleaching, ironing, drying, and removal of pilling are all processes that can prolong or shorten a textile's technical and aesthetic lifetime depending on the good the user is at judging the appropriateness of these methods (Kelley, 2009). Studies find that garments are more likely to deteriorate due to incorrect selection of wash cycles, use of abrasive detergents, incorrect use of fabric conditioner, unnecessarily frequent washing, and tumble-drying than through wear (McLaren et al., 2015).

Consistent and concise information about garment care, in the form of a required, standardised care and maintenance label, will enable consumers to choose appropriate care methods, reduce their water, energy and chemical impacts from incorrect laundering, and facilitate technical and aesthetic durability of textiles. The use and effectiveness of care labels are high so long as the information is relatively simple (Shin, 2000).

A care label should additionally provide information — or a link to information — on how to repair or access repair services.

<b>Potential means of action</b>	Textile Labelling Regulation (European Parliament & European Council, 2011)	Requirements for care and maintenance labelling should ideally be considered as part of the planned review of the Textile Labelling Regulation, where the Commission will introduce new mandatory disclosure of information (European Commission, 2020b).
<b>Potential standards/testing methods</b>	A standard for care labels already exists: ISO 3758:2012 (The International Organization for Standardization, n.d.-b)	Bauer, B. et al. suggest the standard as a testing /documentation option (Bauer et al., 2018).
<b>To be determined</b>	If a care label should be a part of the digital product passport.	

## Suggested Requirement

### Maximum % of elastane

Fabrics must not contain more than a threshold % of elastane

Type of Ecode-sign requirement	Performance	Information
	x	
Justification	<p>A maximum % of elastane in clothing would provide the circumstances for more durable, reusable, repairable, upgradable, and recyclable textiles.</p> <p>As the amount of elastane in fabrics is increased, often to offer enhanced comfort, the tensile and the tearing strength values decrease (Özdil, 2008) - causing abrasion and influencing durability, limiting the probability of the garment being reused, repaired, and upgraded. Furthermore, elastane is a significant impediment in textile-to-textile recycling (Payne, 2015).</p>	
Potential means of action	Extended producer responsibility	An eco-modulated fee under the EPR can complement the requirement
Potential standards/testing methods		
To be determined	<p>Specific garment types, such as sportswear or swimwear, are typically produced with high elastane content to aid product-specific functionality. There may therefore be some need to differentiate between product categories. However, sportswear should not be exempt from, e.g., pilling requirements and should perform to a minimum standard of expected use.</p>	

## Suggested Requirement

### Minimum tensile strength of seams

Seams on sewn garments must resist tearing off a minimum of x (test score) according to a set standard

Type of Ecodesign requirement	Performance	Information
	<b>x</b>	
<b>Justification</b>	<p>Garment deformation sometimes occurs as the seams open under load (Dai &amp; Li, 2006a) due to poor seam strength, causing seam slippage. Failure due to poor seam strength makes a garment unusable and exposes it to premature disposal even though it is still in good overall condition. A minimum requirement on seam strength would consequently increase durability and enable re-usability.</p>	
<b>Potential means of action</b>		
<b>Potential standards/testing methods</b>	ISO 13935	ECOS suggests the standard as a testing /documentation option(Botta et al., 2022).
<b>To be determined</b>	<p>Seam strength depends on several factors: seam type, stitch type, stitch density, fabric strength, thread strength, and the thread tension applied to the seam(Botta et al., 2022). It is also affected by the material composition of the sewing thread and by the sewing machine (Annis, 2012). Identifying product categories is needed to provide meaningful requirements so that synthetic thread is not unintentionally favoured and promotes composite products, i.e. synthetic thread for products otherwise made of natural fibre. These categories may be defined from function rather than the end product.</p>	

## Suggested Requirement

### Threshold requirements on chemicals harmful to humans and ecosystems

The total amount of a chemical substance negatively affecting human health and ecosystems must not exceed  $x$  (test score) post-manufacture.

Type of Ecode-sign requirement	Performance	Information
	$x$	$x$
<b>Justification</b>	<p>Harmful chemicals may remain in garments after the manufacturing process. Chemicals such as phthalates (Antal et al., 2016), nonylphenol ethoxylates (NPEs) and PFAS may leach from materials and migrate through skin, into the air or waterways, harming human health and food chains and causing irreversible damage to our ecosystems (Ellen MacArthur Foundation, 2017).</p> <p>It is necessary to set stringent maximum thresholds for chemical content in consumer-ready garments and thereby place liability for garment safety with EU retailers/distributors and away from the consumer, to whom these dangers are invisible. Where appropriate, harmful chemicals should be outright banned on the EU market, e.g., as was proposed for PFAs (RIVM, 2023).</p> <p>Threshold requirements for chemicals may additionally improve working conditions in manufacturing and should be developed to address chemicals detrimental to conditions in primary manufacturing, use, and recycling processes.</p> <p>The thresholds for chemical content should depend on the individual chemical.</p>	
<b>Potential means of action</b>	<p>Digital Product Passport</p> <p>Extended producer responsibility</p>	<p>The information should be available in the Digital Product Passport as some substances influence the possibilities for recycling. Furthermore, it enables the possibility of calling back dangerous products.</p> <p>An eco-modulated fee under the EPR can complement the requirement.</p>
<b>Potential standards/testing methods</b>	<p>PFAS: Combustion Ion Chromatography of fluoride (CIC-F)</p>	<p>Suggested as a testing/documentation option by Bauer, B. et al. (2018).</p>
<b>To be determined</b>	<p>A full review of all chemical substances negatively affecting human health and the ecosystem currently used in garment manufacturing is needed to set meaningful limitations or outright bans.</p>	



## Recommendations for Further Work

This consultation response has centred performance and information requirements to improve preconditions for a prolonged garment use phase by addressing the functional and aesthetic problem areas that lead to premature disposal or outright harm to the people wearing the garment.

We believe that garment systems should be designed to produce products that can and will live long product lives and see many uses. Use is a determining factor for the product's overall environmental impact. Creating conditions for prolonged use is necessary to achieve an overall slowing of garment consumption. This paper does, however, not cover all requirements that may be relevant to mitigate disposal or improve resource and energy efficiency in manufacturing, distribution, or end-of-life. However, these requirements are equally important as the areas are interdependent. E.g., the requirements should correspond with requirements to improve working conditions and safety in manufacturing to avoid exacerbating existing problems through burden-shifting.

We recommend that the future Ecodesign forum for textiles is divided into working groups with assigned subcategories within textiles. Textile is a broad category, and as demonstrated within the subcategory of garments, the level of complexity is immensely high.

Defining meaningful thresholds for some of the suggested garment-specific requirements will be challenging. It will be necessary to differentiate between types of fibre, fabric, or product categories. This exercise requires consultation with a broad range of professionals, such as textile and chemical engineers, knowledge institutions, manufacturers etc. However, it is crucial that subcategories of garments, such as, e.g. swimwear or sportswear, are not exempt from ecodesign requirements altogether. Any garment that impacts our systems, resources and environment should perform to a minimum standard of expected use.

Careful consideration should be paid when setting requirements across fibre and fabric types to ensure synthetic or natural fibres are not unintentionally favoured in tests. Whether synthetic or natural fibres are preferable continues to be a contended subject, not least because the cheapness of synthetic fibres drives down the value of garments and has been a primary driver of fast fashion.

Some 'means of action' suggested in this document (e.g., modulated fees, digital product passports etc.) are prerequisites for a solution to the current e-commerce practices, which allows non-EU manufacturers to bypass EU retailers and distributors and sell products directly to consumers (Long & Molteni, 2023). This is not only a problem for potential garment requirements but a difficulty facing all EU regulations. The problem should be addressed across product categories so that sub-par or harmful products do not find themselves *en masse* in the EU, burdening our waste systems, polluting our environments, or making us sick.

Due to the textiles' high complexity level and the subcategory of garments, known means of action may not be sufficient. Therefore, we recommend the Ecodesign forum consider new means of action for implementing garment performance and information requirements.

## Conclusion

Addressing textiles, and subsequently fast fashion garments, under the ESPR framework will be an essential step in archiving the objectives of the European Green Deal and addressing core problems created by fast fashion. In line with these objectives, it is necessary to set strategic requirements under the ESPR for the textile subcategory garments to ensure that garment products placed on the EU market are suited to prolonged and active use by being durable, reusable, and repairable. By reviewing current research on garment durability and factors for early disposal, we recommend that the EU's textile forum:

- Is divided into relevant working groups (garments, footwear, furniture etc.)
- Define a minimum expected lifetime for garments to benchmark minimum threshold recruitments against and to ensure cohesiveness across individual requirements
- Assemble cross-disciplinary teams with stakeholders from the entire value chain represented
- Evaluate individual performance and information requirements on labelling, fibre length, chemicals and so on, as suggested in this document

Textiles are currently the product group with the highest potential for lowering their environmental impact through moves to increase product durability and lifetime. Doing so is not only in line with the EU's circular strategy but also necessary to mitigate damage to our environment and human health.

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# 08

## Potential Environmental Benefits

In this chapter, we will evaluate and discuss the potential environmental benefits of our suggested requirements and, therefore, also discuss Life Cycle Assessment (LCA) as a calculation method for measuring these environmental benefits.

## 8.1 Life Cycle Assessments

The ESPR states in its Article 5 on Ecodesign requirements;

*“4. When preparing ecodesign requirements, the Commission shall:*

*(b) carry out an impact assessment based on best available evidence and analyses”* (European Commission, 2022e, p. 50)

In Annex 2 on the procedure for defining performance requirements, it is elaborated that any performance requirement shall have a technical, environmental and economic analysis of the product in question (European Commission, 2022a, p. 3).

The most common way to evaluate environmental impacts is through a Life Cycle Assessment (LCA). If we want to propose ecodesign requirements for garments, we must discuss the value and pitfalls of conducting environmental impact assessments on a group of products like garments.

### **A brief introduction to LCA**

LCA is a tool certified by its ISO standardisation (ISO 14040/14044) and used to assess a product's environmental impact from a life cycle perspective (Hauschild et al., 2018). This process involves using data from all processes from resource extraction, production, distribution, use and end of life, combined with comprehensive coverage of environmental issues – typically around 15 impact categories. By doing this, LCAs holistically assess a product's environmental impact. A life cycle perspective provides the foundation to identify and prevent burden shifting be-

tween life cycle stages and impact categories when working to lower the product's environmental impact (Hauschild et al., 2018).

However, the extensiveness of LCAs also becomes their limitation as it involves simplifications and generalisations in the modelling and prevents the calculation of *actual* environmental impacts (Hauschild et al., 2018).

For example, to gain the most reliable assessment of a specific garment's environmental impact, comprehensive data collection of processes involved in material extraction, production, distribution, use and end of life of that specific garment is needed. In the garment industry, transparency is rare. Retailers do not always trust their supplier's data and therefore conduct site visits. In fact, the value chains in the textile industry are often so atomised and opaque to the degree that reliable data is either unavailable or extremely difficult to obtain (Klepp et al., 2023). Therefore, using generic data where product-specific data cannot be obtained is common. Moreover, modelling and gap-filling of the LCA happen based on assumptions from secondary sources. Ultimately resulting in what is, at best, an approximation of that specific garment's *actual* environmental impact.

### **LCA, Higg MSI and ESPR**

To make an LCA for a product group like, e.g., cotton T-shirts, the ESPR is by nature obliged to use generic data based on a representative selection of that product group. It would make little sense to use product specific data when the performance requirement would affect thousands of different cotton T-shirts produced by thousands of companies under vastly diverse conditions.

The garment industry has been using the Higg Materials Sustainability Index (MSI) as

their feedstock of generic data in generating LCAs for years (Laitala et al., 2018). However, the transparency of the Higg MSI is limited as the underpinning data, assumptions, and other critical information are not publicly available. We know that the industry submits the data available in the Higg MSI and that it is highly criticised for being outdated (Klepp et al., 2023). Moreover, the Norwegian Consumer Authority criticises MSI for not including environmental impacts beyond the production phase – leaving out use and, consequently, the product lifespan and end of use in their calculations of the environmental impact of textiles (Forbrukertilsynet, 2023). The industry has a huge problem when they use MSI as the foundation of its marketing on environmental impacts. The data is misleading, a conclusion made in the spring of 2022 by the Norwegian Consumer Authority (Forbrukertilsynet, 2022).

Nevertheless, the ESPR requires an environmental assessment of a product to develop performance requirements. Moreover, the ESPR suggest “*quantification of a product’s environmental impact ... [is] based on the Product Environmental Footprint method [PEF]*” (European Commission, 2022d, p. 45) – a method based on LCA and established by Recommendation (EU) 2021/2279 (European Commission, 2022d; European Union, 2021) and partially based on Higg (Quantis, 2021). The Commission thereby leaves itself with no choice but to perform LCAs based on the poor generic data available, ruled as misleading by the Norwegian Consumer Authority and criticised by Fletcher et al. (2023) in their position paper to the ESPR, to be unsuitable as a basis for policymaking. It is simply too poor (Fletcher et al., 2023).

### **Garment lifetime and LCA**

The lifetime of a garment defines how often it must be produced to fulfil a functional unit. Defining a functional unit is the first step in

any LCA and is defined by asking “What?”, “how much?”, “for how long/how many times?”, “where” and “How well?” and is essential to support a fair and relevant quantitative comparison of alternative ways of providing a function (Hauschild et al., 2018).

If the functional unit is ten years, but the garment lifetime is 5, it must be produced twice to fulfil the functional unit. This is why garment lifetime is dominating for its environmental impact. The lifetime can be defined by, e.i., the number of uses or years before its end of life. PEF, e.g. has defined a lifetime for a t-shirt to be 45 wears (Quantis, 2021). Assuming you wash your T-shirt once a week and you lean against PEF’s duration of a T-shirt, the expected lifetime is shorter than a year.

In developing ecodesign requirements, an ambitious functional unit appropriate to relevant product groups is vital. 45 uses pr. T-shirt is – in our perspective – not acceptable. It leaves no incitement to design or to produce garments to withstand a long and continuous active use phase. We advocate that a minimum expected lifetime for garments is defined to ensure a cohesive and target-based strategy for minimum functional durability across individual ecodesign requirements (Brøste & Eriksen, 2023).

### **LCA potentially leading the industry to a fossil fuel addiction**

The LCA method has been criticised by Klepp et al for favouring synthetic fibres over natural fibres due to its limited attention towards the difference between renewable and non-renewable resources, biodegradability and focus on land use (Klepp et al., 2023). When the totality of the complexity of textile products is not included in our assessments, we overlook unwanted consequences — potentially leading to the industry into a fossil fuel addiction and counteracting the Strategy for Sustainable and Circular Textiles’ objective to

*make fast fashion out of fashion*, as petroleum-based materials are one of the main drivers for fast fashion (Fletcher et al., 2023).

### **Representing actors through LCA methods**

Criticism of LCA as a calculation method in relation to the ESPR and for garments' environmental impact is plentiful (Fletcher et al., 2023; Klepp et al., 2023; Nygaard et al., 2023), and the discussion is immensely important. Ultimately, an LCA is only as valid as the data it is based on and the assumptions made throughout the calculations.

In this context, it is also worth speaking of representation. LCA based methods have become a fundamental tool with which we represent non-human actors who would otherwise be excluded from decision-making: the CO<sub>2</sub> in our atmosphere, the aquatic life in our oceans, the cancerous cells in our bodies, etc. These actors are not silent (indeed, they act at great expense to us), but we can only make sense of them through charts, reports, and pictures of textile mountains decaying in third-world countries.

Environmental impact assessments enable us to represent many such actors simultaneously by including a wide array of impact categories. However, these representations are inherently reductive, and when the basis for these translations (the process in which we go from an actor's full complex reality to a line on a graph) is opaque, misleading, or entirely wrong, then we are misrepresenting or silencing them. Consequently, these actors will continue to act in a subversion of the emerging network we are trying to build. Implicit in the inclusion (or exclusion) of an impact category and how these are weighed and even in their emission factors is the power to give one actor prominence over another. Likewise, will an ecodesign requirement, on fibre length, pilling or chemical content, promote one actor over another, as

some materials will inherently perform better in tests than others. Over time, this could cause the fashion industry to move from one fibre type to another based on, e.g. marginal CO<sub>2</sub> reductions or because the tensile strength of polyester thread is higher than cotton.

It is perhaps a banal observation that better data quality and transparency will allow for better representation. However, what we are posing here is that representation should be deliberate. When the EU made energy efficiency an informational requirement, preference was deliberately given to those electronics that could perform most efficiently (European Commission, 2015b). The same level of intention should be given to garments by asking the hard questions of what the future of garment consumption should look like. We would propose (in the spirit of pragmatism) that while we chase data perfection, more types of representations should be deployed in the assessment of the potential benefits and harms of ecodesign requirements and that these representations should make visible the consequences of these power imbalances.

This discussion goes far beyond the scope of this thesis, as the ESPR frames the space for our work. In the next section, we will therefore assess the potential benefits of the suggested requirements within the EPSR space and on the premise of these LCA-based methods while being cognisant of their various pitfalls.

## **8.2 Potential Environmental Benefits of Suggested Requirements**

Predicting the potential environmental benefits of the proposed ecodesign requirements relies on several fundamental factors.

Firstly, a minimum expected lifetime for garments must be defined and reflected in the



functional unit of the LCA. If the functional unit is not ambitious, the suggested requirements will have accordingly unambitious thresholds, leaving them with little ability to decrease the environmental impact, as the durability of the products will continue to be short and uphold production and consumption rates.

Secondly, the potential environmental benefits of the suggested requirements ultimately depend on the data used in the LCA. Potentially a marginal reduction in CO<sub>2</sub> for one material could be the result of the sensitivity of the background data. As mentioned, the data provided to perform an LCA dictates the result. Misleading data will provide a result that misrepresents reality and leave us with little understanding of the potential environmental benefits of the suggested requirements.

Thirdly, our suggested requirements would make garments suited for a long and active use phase and remove the least durable garments from the market. However, any potential environmental benefit assumes that increased durability will translate to a decrease

in consumers' consumption of garments, as they will buy less and keep it longer. The same is true for the benefits of care information requirements or sizing information, as these depend on changing consumer practices.

In general, consumer practices must change to decrease the environmental impact of the textile industry and environmentally friendly consumer behaviour must therefore be promoted in combination with the ecodesign directive, in order for a change to be effective.

### 8.3 Chapter Conclusion

It is nearly impossible to predict any potential environmental benefits derived from the proposed ecodesign requirements. Environmental impact reductions are depended on what is defined as the minimum expected lifetime, whether consumer behaviour will be transformed by initiatives in combination with the ESPR, and perhaps most importantly, what data is used in the calculations.

# 09

## Product Service Systems and ESPR

In this chapter, the ESPR will be discussed in relation to product service systems and how these might support each other towards making fast out of fashion.

In Chapter 4, we suggested that promoting product service systems (PSS) would be an approach to incentivise design that addresses the design-related problems outside the scope of the ESPR. The following chapter discusses what opportunities and limitations this would foster.

## 9.1 Introduction to PSS and Garments

Traditional business models that follow the linear economy rely on continuous sales to drive profits. In contrast, PSS allows companies to profit from resource circularity in ways they would not have achieved through a linear model (Bocken et al., 2016). In a PSS, businesses retain some ownership of the functionality of the products or services they sell through models that range from offering product support like guarantees or maintenance on sold products (product oriented model) to renting and leasing models where the use of a product is the commodity (use-oriented model) to models that purely provide the results of a service (result oriented model) (Barquet et al., 2011, p. 333).

In a garment context, a business model offering product guarantees, laundering and repair, or use-oriented schemes like renting or leasing of occasion wear would incentivise slower and more thoughtful design, as companies would ideally want functionally and aesthetically durable products, where the number of uses per product can be maximised.

However, these models all suffer from the fundamental assumption that garments can and will retain enough value to make renting, repairing, or even cashing in on product guarantees more profitable and less of a hassle than buying new garments. They also assume that these models will replace current linear consumption and not simply add another avenue for consumption.

### **Product oriented models:**

A product-oriented business' value proposition is to offer repair and maintenance on a product the consumer owns. Suppose the business offering repairs was also the retailer. In that case, this should prompt the design of functional and aesthetically durable garments, e.g., made in timeless design and with comfortable materials to ensure loyal customers and minimise expenses from repairs. However, as Bocken points out, these models are typically restricted to high-end brands for which customers are willing to pay premium prices (Bocken et al., 2016). Research consistently demonstrates the link between price and willingness to repair (Laitala et al., 2015; Wakes et al., 2020). When garments are not repaired, or opportunities for repair, such as repair cafés, are passed over, it is because the value of the garment, once a failure has occurred, is too small to bother with. So far, these value propositions have not been demonstrated to apply meaningfully to low-end garments. In fact, when the retail conglomerate Bestseller, which competes in the low-priced fast fashion market, attempted to offer repair services for their apparel in a pilot project, they found that few customers were interested in the service (personal communication, Petersen, C., 23.02.23)

### **Use oriented models:**

Rental models may very well be the solution to occasional wear, i.e., garments only bought to wear for weddings or New Year's Eve etc. However, this market exists alongside a booming secondhand market, over which its only real competitive edge is the ability to offer the latest fashion consistently. Outside of niche garment groups like tuxedos, where garments may stay in fashion for longer, it is doubtful that rental models can outcompete a secondhand market on price

when the latter is fuelled by continuous over-consumption. As Fletcher et al. (2023) point out: “...it has not been documented to what extent renting or other systems of sharing garments replace the purchase of new items and thus what are their environmental gains (Fletcher et al., 2023, p. 2)” In other words, whether rental business models are viable economic strategies matters very little from an environmental perspective if these garments are not replacing the production of new garments.

In 2021 the global secondhand apparel market was valued at 138 Billion USD and is expected to rise to 350 billion USD by 2027 due to increased online secondhand shopping and textile collection and sorting (Thredup, 2023). Though it is still a relatively small percentage of people in Denmark who engages in commercial reuse, it is undoubtedly a growing movement, the scale of which is perhaps best illustrated by the Copenhagen event calendar (Oplevelser i København, 2023), where in the summer half year between to 5-12 different flea markets are listed every weekend, and where the most prominent products sold are garments. In an environment where perfectly fine garments are sold at a mere fraction of their original price, it is doubtful that a rental dress won't simply exist alongside additional consumption.

## 9.2 Potentials and Limits for PSS and ESPR

The critique outlined in the previous sections is not problems inherent to PSS systems or circular business models offering durable garments but instead rooted in the same mechanics that enabled fast fashion: introducing synthetic fibres into textiles.

While the mechanics of a linear economy coupled with fast fashion's supply-chain management and aggressive marketing facilitates an increasingly faster turnover of

products by driving and responding to demand, the low price of synthetic fibres has allowed garment prices to remain consistently low while consumption has increased. In other words, demand is not regulated by supply because supply in the form of fossil fuels continues to be cheap.

The most significant potential for the idea of ecodesign requirements is not only in removing garments that cannot perform to a minimum standard but in the potential to reintroduce steps like quality control into the value chain and exclude the cheapest and least durable materials. This would mean an increase in the overall price of garments across the EU markets due to a higher average lead time and price of materials. If the price hike is large enough, this would create space for more PSS-based garment business models and a better market for repair and tailoring to adjust ill-fitting clothes.

However, this potential is also the ESPR's most significant limitation. In their own words:

*“Ecodesign requirements shall meet the following criteria: (...) (c) there shall be no significant negative impact on consumers in terms of the affordability of relevant products, also taking into account access to secondhand products, durability and the life cycle cost of products;”* (European Commission, 2022d, p. 52)

While this statement is somewhat couched by including terms like ‘relevant products’ and by accounting for ‘secondhand products’, it betrays an overarching (and perhaps well-founded given the democratic nature of the EU) fear of inconveniencing consumers and businesses by forcing higher prices.

However, any significant increase in the durability of garments will lead to higher production costs. In the 2013 paper for WRAP, Cooper et al. write:

*“...creating clothes that last longer is likely to lead to an increase in production costs, which is something that retailers would naturally look to pass on to their customers. Usual cost models within the industry indicate that an extra £1 spent on material, for example, would mean an increase in price-point for the consumer of £4-£5. Fashion businesses can only charge what the market will pay, and it is unlikely that the market will allow producers and retailers to raise prices for garments without tangible enhancement of the product” (Cooper & Hill, 2013, p. 14).*

In this view, any product requirement promoting the physical durability of garments will have to be so minimal in cost and implementation as to be negligible.

In the same paper, Cooper et al. conclude:

*“...Increased longevity will not necessarily represent a sufficient enhancement to the consumer to justify paying extra if it is not a primary reason for buying the item” (Cooper & Hill, 2013, p. 14)*

Without a significant price hike on garments to promote durability as a value proposition and primary reason for purchase, we would have to rely on an ‘organic’ cultural shift towards consuming fewer but more expensive garments. Cooper et al. suggest businesses themselves should facilitate the education of consumers on the environmental impact of their garment consumption through marketing promotions.

Indeed, studies show that consumers are aware of the impact of fast fashion on the environment (Papasolomou et al., 2023) and that there has been a trend in the Western world towards buying more ‘luxury’ brands with a focus on sustainability in their marketing (Alderman et al., 2022) Sustainability is a growing consideration when purchasing gar-

ments (Albella et al., 2022; Vejen til et tøjforbrug med mindre miljø-og klimaaftryk, 2023), However, at the same time, Mcinsey’s overview shows growth in the discount market. There has been no prevailing trend towards a narrowing or slowing of consumption of garments.

Indeed, it is misguided to assume that focusing more on sustainability will promote less consumption. A simple trip to the mall reveals discount brands and high-end brands heavily promoting garments made of ‘organic cotton’ and ‘recycled polyester’ (Appendix D). This is a move in which they allude to a lower environmental impact and pander to an environmentally conscious customer without promising durability, repair or reflecting any presumed higher quality through higher pricing.

## 9.3 Chapter Conclusion

As a concept, product service systems present opportunities for product and user oriented business models to profit from circular models where less but more durable garments are sold. However, as increased functional and aesthetic durability is not a prevailing primary reason for garment purchase, it is doubtful that service models offering rent and repair will not just exist in addition to current accelerating consumption. This will be the case until we start valuing garments enough to make renting, repairing, or even cashing in on product guarantees more financially and emotionally profitable and less hassle than buying new garments.

However, a significant price hike on garments to promote durability as a value proposition and primary reason for purchase is not possible under the ESPR framework as it is currently written. The ESPR does not allow for a significant impact on the affordability of products, even though this would significantly support the transition to more product service systems in the garment industry

# 10

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## Consumers & Information Limits

In this final chapter, we will revisit the notion of information and performance requirements and how these are can help the consumer towards more sustainable garment consumption. In doing so, we will discuss the approach this thesis has taken to consumer agency and environmental information labels.

## 10.1 Green Claims vs. Sustainable Consumption

With chapters 8 and 9 in mind, it is worth critically revisiting some of the underlying decisions made in selecting our performance and information requirements regarding consumer agency. In this chapter, we will critically reflect on the consumer's role in fast fashion and how ecodesign requirements as a legislative tool support – or fail to support – consumers in transitioning to make fast fashion out of fashion.

The previous chapter referred to the current marketing information consumers must navigate when buying new garments. From the outset of this thesis, it has been our position that the most critical factor a consumer should consider when purchasing new garments is whether they will use them for a long time. This is, of course, because use determines the overall impact of the garment, but also partly due to the currently unreliable nature of green claims as a means of pushing consumption in a less environmentally harmful direction by making consumers select based on material choice.

Our field trip to the local mall (Appendix D) revealed not only a swarth of false green claims but also a pervasive tendency to promote materials that *sound* sustainable, i.e. 'organic' or 'recycled' but without the context, the consumer needs to understand whether the garment is 'better' for the environment than any other garment. The fact is that even leading experts on textiles would currently be hard-pressed to meaningfully recommend one garment over another purely based on material type without first conducting a full comparative life cycle assessment with access to product specific data. In such a complex information environment, consumers cannot be expected to choose one or the other meaningfully. Partly in acknowledgement of this dilemma, the Industrial strategy refers to EU's New Circular

Economy Action Plan, which addresses this and writes:

*"The Action Plan also includes measures to empower consumers to play a more active role in the circular economy. Consumers should receive trustworthy and relevant information to choose reusable, durable and repairable products."* (European Commission, 2020b, p. 9)

And the ESPR Article 14 includes if the information is presented in a label that:

*"...the layout of the label (...) shall enable customers to easily compare product performance in relation to the relevant product parameter and to choose better performing"* (European Commission, 2022d, p. 59).

But what is 'trustworthy and relevant information' concerning garments when the question of whether we should primarily design for use or recycling and all the implications stemming from a definitive answer in either direction is still being debated. A primary focus on design for recycling would inevitably lead to further plasticisation of garments. Synthetic fibres can be chemically recycled back to a monomer state (oil) and recycled to new garments, where natural fibres inevitably degrade and shorten in loops of down-cycling (Sandin & Peters, 2018). Nevertheless, research indicates that consumers prefer natural fibres and use and reuse them for longer despite presuming worse on some technical parameters for durability (Fletcher et al., 2023; Laitala & Klepp, 2020).

Comparative labelling information requirements, such as the energy efficiency label for electronics, have been successfully implemented as part of ecodesign requirements and have helped push that sector toward energy efficiency (European Commission, 2015b). However, energy efficiency is a relatively easy thing to measure. Comparatively, it is unclear what parameters a garment label should include to provide consumers

with the information to make informed decisions. Should a label include information on all product parameters for consumers to peruse at their discretion? Or only a selection? And if the latter, then which?

Added to this complexity is consumers' complex relationship with garments and fashion compared to other product categories, making the fashion sector particularly difficult to tackle. Boström and Micheletti (2016) note that what makes garments different from other consumer product categories are the sector-specific barriers that consumers face concerning not just a limited amount of trustworthy information and availability of alternate products, but also "*...societal norms and status connected with personal visibility, appearance, and style*" (Boström & Micheletti, 2016, p. 371).

Transforming the EU's current consumption of garments into a less environmentally (and socially) harmful one cannot be solved solely by providing consumers with a more extensive informational foundation from which to deploy their buying power. Instead, consumers need more support than just information to transform these socio-technical relations that keep them contributing to a linear fast fashion system (Isenhour, 2010).

Indeed, too much information can lead to dilemmas, tensions, and paralyzes when environmentally conscious consumers attempt to engage sustainably with their consumption patterns. Longo et al. write:

*"... the same knowledge supporting sustainable practices can also represent a source of confusion and distress, even to the extent that a person becomes burned out. Paradoxically, having too much knowledge can represent a burden in that consumers might realise how difficult the sustainability challenge is"* (Longo et al., 2019, p. 771).

In summary, too much information or presented in the wrong format may negatively contribute to consumer agency. Conversely, more easily digestible information like a CO<sub>2</sub>eq impact indicator or an opaque 'durability' indicator may be so reductive or based on misleading and generic data as to be useless or promote unforeseen rebound effects.

For these reasons, information requirements indicating environmental performance were excluded from our consultation response. In fact, the information requirements included in the consultation response were limited to the types of information that consumers already access when interacting with their garments, i.e., care labels and sizing.

Behaviour analyst Charlotte Loise Jensen points out that it is unreasonable to expect consumers to consider more than the functionality of a garment in the purchase situation, especially when the best thing they can do is choose the garment they will use for the entirety of its physical lifetime (personal communication, Jensen, C., 23.02.23).

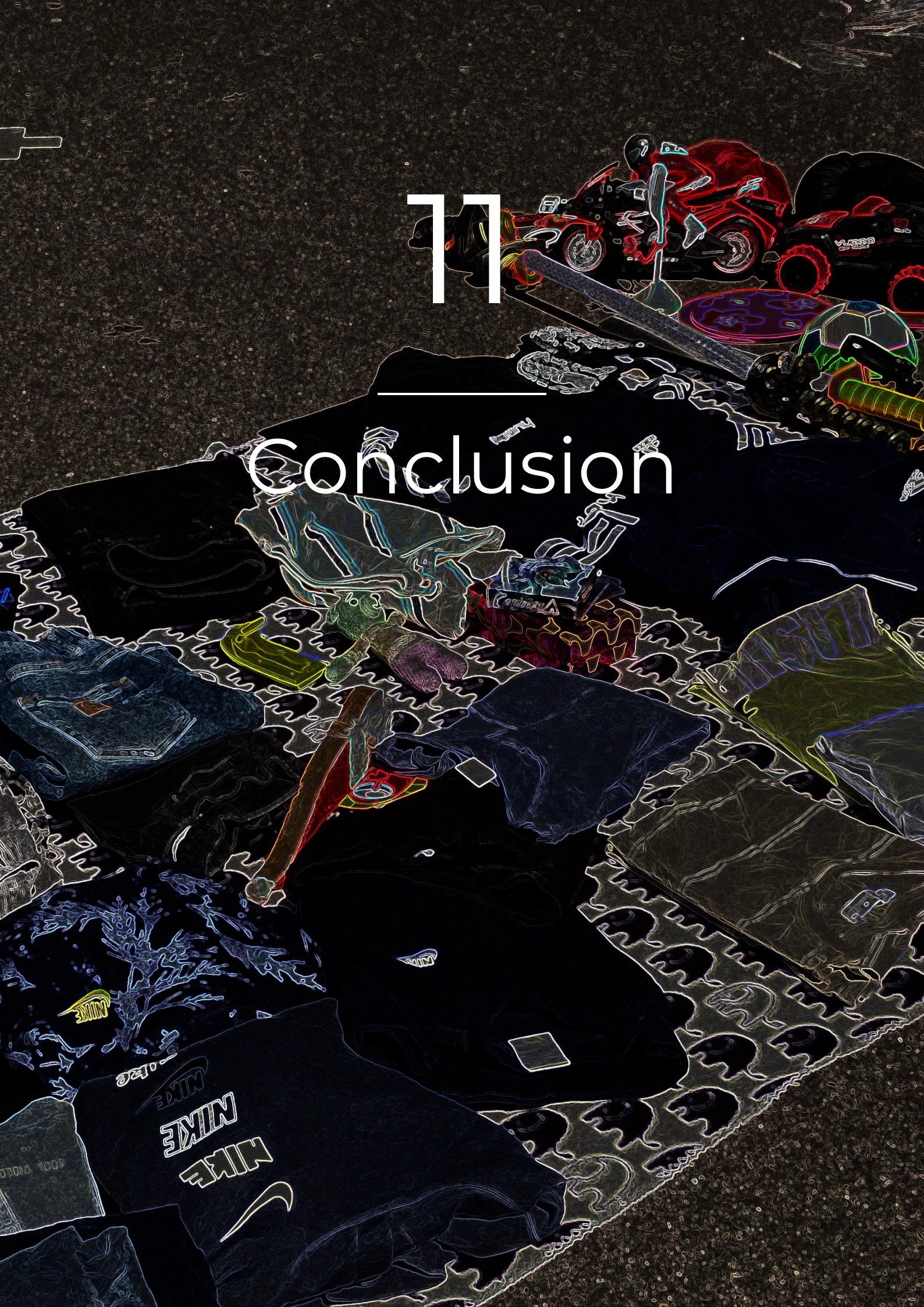
## 10.1 Chapter conclusion

Information requirements indicating environmental performance were excluded from our consultation response due to the complex nature of recommending any garment as more sustainable than another. While the effectiveness of ecodesign requirements is hampered by the EU's aim not to impact product affordability, they still have a place. Performance requirements that lighten the burden of consumer choice by removing the most undesirable garments from the market and improving the information on things like care and size must be a positive step in the right direction.



11

# Conclusion



Fast fashion thrives at the expense of our shared resources, waste systems and environments. Moreover, there is a lack of incentives and little regulation to make large retailers and distributors design and produce garments that can retain their aesthetic and physical functionality throughout many years of use.

The value of garments is so low that consumers have no reason to use, reuse, or repair their garments, and movements to promote environmental awareness continue to lag behind other sectors, and this is critical as the most influential factor for a garment's environmental impact is the length of its use phase. The ESPR presents a window of opportunity to lower the environmental impacts of the textile industry by regulating production and consumption patterns through performance and information requirements. If deployed ambitiously, ecodesign requirements could be an instrument to narrow and slow the unsustainable production and consumption patterns of garments and make fast fashion out of fashion.

This thesis defined the EU's Call for Evidence and the ESPR as a space for actors to express their concerns and suggest ways to create alignment with the complex network of actors surrounding the ESPR composed of the Green Deal, the Strategy for Sustainable and Circular Textiles, the Industrial Strategy, Circular Economy Action Plan, and the Call for Evidence. Using an Actor Network Theory lens combined with a Staging Negotiation Spaces framework, this project has identified the hidden actors that affect *end of use* through a literature review and represented these actors in negotiations to formulate a comprehensive list of ecodesign requirements that will improve conditions for garments placed on the EU's internal market to have a long and continuous active use phase. In these negotiations, fibres, fabric, laundry practices and labels were invited into the

space of the ESPR and their roles and meanings were redefined. Actors from the academic field and environmental agencies were invited into these negotiations and asked to inscribe their concerns onto our consultation response.

The outcome of this work was a comprehensive list of suggested performance and information requirements connected to the ESPR's article 5 product aspects: durability, reliability, reusability, upgradability, and repairability:

- Size labelling of key body measurements disclosed in metric units
- Minimum fibre length
- Size labelling of key body measurements disclosed in metric units
- Minimum fibre length
- Maximum dimensions in % on shrinkage after washing and drying
- Maximum pilling of x
- Colour fastness, washing, precipitation, wet and dry rubbing, light/UV exposure
- Care and maintenance labelling
- Maximum % of elastane
- Minimum tensile strength of seams
- Threshold requirements on chemicals harmful to humans and ecosystems

In addition to these requirements, we formulated the following recommendations for the textile forum that have to decide on the final ecodesign requirements:

- The forum be divided into relevant working groups (garments, footwear, furniture etc.)
- Define a minimum expected lifetime for garments to benchmark minimum threshold requirements against and to ensure cohesiveness across individual requirements
- Assemble cross-disciplinary teams with stakeholders from the entire value chain represented

- Evaluate individual performance and information requirements on labelling, fibre length, chemicals etc.

The potential environmental benefits derived from our suggested requirements will depend on how the minimum expected lifetime is defined, whether consumer behaviour will be transformed by initiatives combined with the ESPR, and what data is used in the qualifying environmental impact assessment. Suppose impact assessments are based on the currently available industry data. In that case, there may be a significant danger of promoting a further plasticization of the industry and, thereby, a continued devaluing of garments. Any testing standard for physical durability should likewise be

carefully evaluated so that it does not unintentionally benefit synthetic fibres and cause rebound effects.

The price of garments is central to whether renting, repairing, or even cashing in on product guarantees is considered financially and emotionally profitable and less hassle than buying new garments, and therefore also vital to the viability of new circular business models that can derive profits from a narrower, and slower consumption. However, it is doubtful that a significant price hike will come on the back of the ESPR as it is currently written.

# 12

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