Nordic Council of Ministers

Mapping Sustainable Textile Initiatives in the Nordic Countries

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This publication is also available online in a web-accessible version at https://pub.norden.org/temanord2023-502.

Chapter 1: Introduction

This report is part of The Nordic Textile Collaboration, a project initiated by Danish, Finnish, Norwegian and Swedish authorities and funded by the Nordic Council of Ministers. The project addresses the significant environmental impacts associated with the production and consumption of textiles, with the aims of:

- Reducing unnecessary consumption.
- Extending the lifetime of textiles.
- Promoting circular business models.
- Stimulating digitalization and traceability in the fashion and textile industry.
- Supporting increased and improved collection, sorting, reuse and recycling of textiles.

In the report, we map existing initiatives in the Nordic countries supporting the transition towards a sustainable and circular textile economy.[1] This mapping acts as a knowledge base to create recommendations for new initiatives under The Nordic Textile Collaboration, where stakeholders across the Nordic fashion and textile industry can come together and shape the future.

The Danish Environmental Protection Agency and the Danish Ministry of Environment have conducted the work presented in this report based on input from a wide range of actors, including members of the steering committee representing The Finnish Environment Institute SYKE, Miljødirektoratet in Norway and Naturvårdsverket in Sweden, as well as actors across the Nordic value chain for fashion and textiles.

1. "Textile" includes apparel, industrial textiles and household textiles, as in UNEP (2020) Sustainability and Circularity in the Textile Value Chain: Global Stocktaking. A "Circular economy" is defined as "one that is restorative and regenerative by design and provides benefits for business, society, and the environment", as in Ellen MacArthur Foundation (2017) A new textiles economy: Redesigning fashion's future, p. 22.

1.1 Reader's guide

The report is organized in the following way: **Chapter 1** describes the current challenges facing the fashion and textile industry. **Chapter 2** explains methods used for the mapping, including data collection and analysis. **Chapter 3** provides an overview of existing legislation on textiles and textile waste in Denmark, Finland, Norway and Sweden, as well as a brief presentation of expected regulation and initiatives from the EU affecting the Nordic textile economy. **Chapter 4** presents findings from the mapping of sustainable textile initiatives in the Nordic countries. The chapter is divided into five sections: 1) Materials and design, 2) Production methods, 3) Consumption and circular business models, 4) Collection, sorting and recycling, and 5) Governance and capacity building. **Chapter 5** introduces how we ensured stakeholder involvement throughout the mapping process. **Chapter 6** summarizes findings from the mapping and concludes by discussing relevant next steps for The Nordic Textile Collaboration.

About The Nordic Textile Collaboration

Steering committee:

Ministry of Environment (DK), The Finnish Environment Institute SYKE (FI), Miljødirektoratet (NO), Naturvårdsverket (SE)

Project coordinator:

Danish Environmental Protection Agency

Project period:

2022–2024

Funded by the Nordic Council of Ministers.

1.2 The state of the fashion and textile sector

Today, the fashion and textile industry is a very resource-intensive sector associated with high CO_2-emissions, as well as a heavy use of water, energy and land. The fashion and textile industry accounts for up to 10% of global Green House Gas (GHG) emissions.[2] The water use of the global apparel industry amounts to more than 215 trillion liters of water per year and impacts water scarcity across the globe.[3] Furthermore, the wet processing stages of dyeing and finishing contribute to GHG emissions from burning fossil fuels to generate the heat and electricity required in these stages of production.[4]

Globally, textile production doubled between 2000 and 2015, and this growth is

2. Existing estimates indicate that the fashion and textile industry contributes between 3% and 10% of global GHG emissions. See, for instance, Ellen MacArthur Foundation (2017) A new textiles economy: Redesigning fashion's future; as well as McKinsey (2020) Fashion on Climate: How the fashion industry can urgently act to reduce its greenhouse gas emissions.
3. UNEP (2020) Sustainability and Circularity in the Textile Value Chain: Global Stocktaking.
4. UNEP (2020) Sustainability and Circularity in the Textile Value Chain: Global Stocktaking.

expected to continue through 2030.[5] In 2014, 100 billion garments were produced globally, corresponding to 14 items of clothing for every person on Earth.[6] An analysis from 2014 published by the Nordic Council of Ministers showed that the annual consumption of new clothing and household textiles per capita in the Nordic countries ranged from to 13.5 kg to 16 kg.[7] This corresponds to between 26 and 48 garments per capita per year.[8] Recent work reports a slight decrease in consumption to 13.2 kg per capita per year in Denmark[9] and to 9.4 kg per capita per year in Finland.[10] However, Nordic citizens' annual per capita consumption of textiles is still greater than the global average.[11] The rapid growth in textiles has largely been accounted for by synthetic fibers, which, over the last 20 years, have grown from below 20% of global fiber production to 62% of global fiber production.[12] As synthetic fibers are produced from fossils fuels, mainly crude oil, this development accelerates the use of non-renewable resources and production of emissions that influence the climate.[13]

In addition, many items of clothing are underutilized. Low-priced garments are said to be discarded after only seven or eight wears[14] and in general, the number of times a piece of clothing is worn before it ceases to be used has decreased in the period 2000 to 2015, while clothing sales have increased.[15] At the same time, large quantities of clothes are discarded. Europeans discard about 11 kilos of textiles every year and, despite the development of recycling technologies, less than 1% of clothes are recycled into new clothes globally.[16] Aside from the large amount of textiles discarded after consumption, recent years have unveiled practices of incinerating unsold clothes and returned items.[17] Furthermore, it has been reported that large quantities of unwanted clothes are sent from high-income countries in Europe to lower-income countries outside of the EU, where they end up in landfills. According to the European Commission, the exports of textile waste to countries outside the EU are increasing and reached 1.4 million tonnes in 2020.[18] Of the clothes actually being donated, only a small fraction is reused within the Nordic countries.[19]

These tendencies of overproduction and overconsumption can be explained by the fact that current business models for textiles are predominantly linear, with fast fashion being the norm and circular initiatives only playing a small role in the market.[20] With the low prices and large selection of clothes due to the rise of e-commerce, it is both easy and cheap to buy new clothes. Consequently, circular business models such as rentals, take-back schemes and repair services, are not widely available nor the obvious choice.[21] These are factors that stand in the way of

5. UNEP (2020) Sustainability and Circularity in the Textile Value Chain: Global Stocktaking.
6. McKinsey Sustainability (2016) Style that's sustainable: A new fast-fashion formula.
7. Palm et al. (2014) Towards a Nordic textile strategy: Collection, sorting, reuse and recycling of textiles.
8. Munk-Andersen (2021) Kampen mod tøjspild er i gang.
9. Watson et al. (2018) Kortlægning af tekstilflows i Danmark.
10. Dahlbo et al. (2019) Textile flows in Finland 2019.
11. In fact, consumption data from Sweden shows an increase by 23% to 14.8 kg per capita in 2021. For more information, see Naturvårdsverket (n.d.) Information om hållbar konsumtion av textilier.
12. UNEP (2020) Sustainability and Circularity in the Textile Value Chain: Global Stocktaking.
13. UNEP (2020) Sustainability and Circularity in the Textile Value Chain: Global Stocktaking.
14. McKinsey Sustainability (2016) Style that's sustainable: A new fast-fashion formula.
15. Ellen MacArthur Foundation (2017) A new textiles economy: Redesigning fashion's future.
16. European Parliament (n.d.) The impact of textile production and waste on the environment (infographic).
17. Petersen & Ebbesen (2020) Nyt tøj i affaldet.
18. European Commission (2021) Proposal for a regulation of the European Parliament and of the Council on shipments of waste and amending Regulations (EU) No 1257/2013 and (EU) No 2020/1056. COM/2021/709.
19. Palm et al. (2014) Towards a Nordic textile strategy: Collection, sorting, reuse and recycling of textiles.
20. Ellen MacArthur Foundation (2017) A new textiles economy: Redesigning fashion's future.
21. Ellen MacArthur Foundation stresses in a new report that circular business models currently account for 3.5% of the global fashion market but have the potential to account for 23% by 2030. See Ellen MacArthur Foundation (2021) Circular business models: Redefining growth for a thriving fashion industry.

a circular textile economy where "clothes, fabric, and fibers are kept at their highest value during use, and re-enter the economy after use, never ending up as waste".[22] Life-cycle assessments show that prolonged lifespan has a tremendous impact on the environmental footprint of textiles: If each garment is used twice as many times before disposal, almost half the environmental impact is mitigated.[23]

Another, related challenge is that green skills and understandings are lacking, both globally and in the Nordic countries.[24] [25] [26] Designers and producers struggle with communicating sustainability and circularity to the public.[27] [28] In addition, unreliable green claims make it difficult for consumers to make informed, sustainable decisions, and there is a growing concern in the fashion and textile industry of being accused of greenwashing.[29] Both issues underline a need to develop ways to not only communicate about sustainability and circularity but also how to document this transition.

With the high consumption of textiles globally and its impact on the environment, there is a need to rethink the way we produce, consume, use and discard textiles. The aim of this report is to highlight areas with a potential for joint Nordic action on these critical issues.

22. Ellen MacArthur Foundation (2017) A new textiles economy: Redesigning fashion's future, p. 22.
23. Sandin et al. (2019) Environmental assessment of Swedish clothing consumption.
24. European Commission (2022) EU Strategy for Sustainable and Circular Textiles, COM/2022/141 final.
25. Dansk Mode & Textil (2021) Bæredygtighed I den danske mode- og tekstilbranche 2021.
26. Avfall Norge (2021) Bærekraft i tekstilanskaffelser for norske kommuner og offentlige virksomheter.
27. Avfall Norge (2021) Bærekraft i tekstilanskaffelser for norske kommuner og offentlige virksomheter.
28. Klepp et al. (2014) Sustainable textile initiatives and suggestions for a Nordic Roadmap.
29. Lifestyle & Design Cluster (2022) Sustainability Priorities and Gaps: Results from 48 textile companies.

Chapter 2: Methodology

The mapping is based on data collected by the Danish Environmental Protection Agency in the period January – July 2022. First, bilateral meetings with members of the steering committee representing SYKE (Finland), Miljødirektoratet (Norway) and Naturvårdsverket (Sweden) were organized with the aim of gathering initial information about how Finland, Norway and Sweden are currently addressing the need for a circular transition in the area of fashion and textiles. To get an initial overview of Danish activities, we drew on existing work and overviews on Danish textile initiatives within the Danish Ministry of Environment and The Danish Environmental Protection Agency.

This first step helped to establish an overview of how textile waste is handled in the Nordic countries, including existing legislation and policies developed to regulate this area (see Chapter 3). The interviews also served to identify relevant projects initiated to stimulate the transition towards a circular textile economy in each country (see Chapter 4). In continuation of the interviews, desk research was conducted to map relevant projects (see Chapter 4). The desk research applied the information gained from the interviews to identify relevant material, including publications, earlier mappings[30] and project databases available online through the webpages of industrial and trade organizations, national authorities, and the Nordic Council of Ministers. To develop and qualify the content of the report, we utilized the expertise and knowledge of Nordic actors across the fashion and textile sector. In this process, we consulted the steering committee for recommendations and advice and reached out to representatives from trade organizations for fashion and textiles in each country for information about ongoing initiatives. Furthermore, we conducted three workshops with actors across the Nordic value chain (see Chapter 5).

The report provides a summary of current trends, rather than a comprehensive overview of all activities taking place in the Nordic countries. This knowledge establishes a basis for discussing the state of the art in the Nordic countries and the

30. These include Klepp et al. (2015) Mapping sustainable textile initiatives: And a potential roadmap for a Nordic actionplan; Lifestyle & Design Cluster (2021) Overblik over udviklings- og forskningsprojekter relevante for en grøn genstart af den danske modebranche; Avfall Norge (2022) Prosjekter innen tekstil og bærekraft; and Kumu Textil Initiativ (n.d.) Översikt av de initiativ vi samlat in så här langt.

types of initiatives needed to move forward from the perspective of a circular economy with sustainable textile production and consumption (see Chapter 6).

2.1 Delimitations

The mapping focuses on collaborative projects initiated by private and public actors in recent years. This means that projects and initiatives of single companies, such as brands that promote repair schemes for their own products or launch collections of recycled fibers, are not included in the mapping. This approach has been chosen as it supports the aim of establishing an overview regarding initiatives and projects that innovate the textile sector as a whole in a more circular direction. Thus, the mapping aids in identifying projects that support a circular transition of the fashion and textile sector. We fully acknowledge the important development that takes place in individual companies in the Nordic countries and how these contribute to the green transition of the industry. In the coming work within The Nordic Textile Collaboration, the work and knowledge of these actors will become equally important.

In addition, it is important to note that most of the projects and initiatives analyzed in this report are ongoing. Thus, it is too early to assess the results and impact of these activities. Instead, the mapping focuses on analyzing the purpose and scope of each initiative. This paves the way for a broader discussion of in which areas it makes sense to establish joint action across the Nordic countries to meet the overall goals of The Nordic Textile Collaboration (see Chapter 1).

Chapter 3: Legislation on textiles in the Nordic countries

Paying attention to existing and forthcoming legislation at national and EU level is important for The Nordic Textile Collaboration, as initiatives taken in this realm need to align with these regulatory frameworks. Therefore, this chapter describes existing and expected future legislation regarding textiles at national and EU level, thus providing an overview of the changes the Nordic fashion and textile sector will need to accommodate in the coming years. The first part of the chapter focuses on the EU requirement of separate textile waste collection by 2025 and how the Nordic countries are preparing to meet this specific regulation. This is followed by examples of voluntary commitments in the Nordic countries that support these legislative initiatives by contributing to a circular transition of the Nordic fashion and textile sector. The chapter ends with a presentation of relevant EU initiatives expected to affect the Nordic fashion and textile industry in the near future.

3.1 Collection of textile waste in the Nordic countries

The EU Waste Framework Directive establishes that all EU member states shall set up separate systems for collection of textile waste by 1 January 2025 to promote high-quality recycling.[31]

This requirement has an impact on the ways in which textile waste is currently managed in the Nordic countries. As shown in Table 1 below, collection of textile waste and recyclable textiles is being reconsidered, including the long tradition in the Nordic countries for collection of reusable textiles by charities and private companies. The table presents an overview of the existing and anticipated legislation that addresses the requirement of separate collection of textiles in the different Nordic countries, thus showing the status of implementation in regard to this specific issue. Table 1 shows that Denmark and Finland require collection of textile waste from 2023, while Norway and Sweden are expecting to begin collection in 2025. Denmark and Finland are planning to establish two streams for collection of

31. European Commission (2008) Directive 2008/98/EC of the European Parliament and of the Council of 19 November 2008 on waste and repealing certain Directives, Article 11.

textiles: one for the collection of textile waste and one for the collection of reusable textiles. In Denmark and Finland, the collection scheme for textile waste falls under the municipal waste management, while charities and private companies are collecting reusable textiles. Norway and Sweden are still to decide which model to choose. In terms of other relevant legislation, a legislative proposal on implementing extended producer responsibility (EPR) on textiles was put forward in December 2020 in Sweden but has not yet been processed. In Denmark and Norway, the consequences of potentially implementing extended producer responsibility for textiles is currently being examined. EPR on textiles would give producers of textiles a significant responsibility for the treatment or disposal of post-consumer products. Thus, it is a policy approach that is gaining attention, also at EU level as described later in this chapter.

Table 1: Future legislation on textile waste in the Nordic countries and status of implementation[32]

	Denmark	Finland	Norway	Sweden
Implementation of EU-legislation regarding separate collection of textile waste by 2025	Separate collection will be required by 1st of July 2023.	Separate collection of textile waste will be required from 2023.	Miljødirektoratet recommends implementing separate collection of textile waste by 2025.	Separate collection is expected by 2025.
Collection methods for textile waste and reusable textiles	Municipal collection at households through pick-up scheme. Collection of reusable textiles will still be undertaken by charities and private companies in a separate stream.	Municipal collection at regional bring-sites and waste stations through drop-off scheme. Collection of reusable textiles will still be undertaken by charities and private companies in a separate stream.	Miljødirektoratet recommends that municipalities can choose whether to implement the collection of textile waste as a pick-up or a drop-off system. Collection of reusable textiles is mainly undertaken by charities and private companies. Municipalities collect a mixture of reusable textiles and textile waste for recycling through drop-off schemes.	Not decided yet. In 2020, The Swedish Ministry of Environment published a report on EPR for textiles with the aim of proposing an EPR scheme for textiles ensuring the separate collection of textiles for reuse and recycling. Some municipalities have separate collection and sorting of textile waste. Collection of reusable textiles is currently undertaken by charities and private companies in a separate stream.
Extended Producer Responsibility (EPR) on textiles	No current plans. Analyses are being conducted on economic and environmental consequences.	No current plans.	No current plans. The Ministry of Climate and Environment has put together a working group to collect knowledge and investigate possible solutions for an EPR scheme for textiles in Norway.	Has been suggested, but legislation process is currently on hold.

32. Information in this table has been provided by the country representatives of the steering committee.

3.2 Voluntary commitments and government initiatives

While the legislation identified above revolves around textile waste management, it should be mentioned that the fashion and textile industry as well as legislators and governmental organizations in all four Nordic countries have launched and are developing several other initiatives to stimulate the broader transition towards a circular and sustainable textile industry. To mention a few, in Denmark and Finland, the fashion and textile industry has made voluntary commitments: In Denmark, a voluntary sector cooperation launched in August 2022 aids in reducing the environmental and climate impact of the textile industry,[33] and the Finnish fashion and textile industry has its own commitment to carbon neutrality by 2035.[34] In a similar vein, the Swedish Environmental Protection Agency, Naturvårdsverket, has had a 3-year government assignment to inform consumers about more sustainable consumption of textiles, together with the Swedish Consumer Agency and the Swedish Chemicals Agency.[35] Furthermore, the Swedish government has tasked the University of Borås with establishing and leading a national platform that offers activities and tools to support companies in the circular transition.[36] In addition, Sweden has established that repairs on shoes, leather goods, clothing and household linen are partly exempted from VAT (reduced from 25% to 6%).[37]

Additionally, the Nordic countries are implementing broader general circular economy strategies that frame the economic transition, as well as programs supporting the uptake of sustainable and circular business models for textiles (see Chapter 4).

33. Lifestyle & Design Cluster (2022) Frivilligt sektorsamarbejde om tekstiler.
34. For more information, see Finnish Textile & Fashion (n.d.) Carbon-neutral textile sector by 2035.
35. See Naturvårdsverket (n.d.) Information om hållbar konsumtion av textilier.
36. The platform is named Textile & Fashion 2030. For more information, see https://textileandfashion2030.se
37. See Skatteverket (n.d.) VAT rates on goods and services. Recently, the Swedish government proposed to change the VAT rate on repairs of shoes, leather goods, clothes and household linen from 6% to 12%. For more information, see Finansdepartementet (2022) Höjd mervärdesskatt på vissa reparationer.

3.3 Expected initiatives and legislation from the EU

Aside from national legislation, actors in the Nordic fashion and textile industry need to pay close attention to upcoming regulation and initiatives from the European Commission. In this section, we briefly present expected regulation and initiatives from the EU affecting the fashion and textile sector, not only in the Nordic countries but in all EU member states in the coming years.

The EU Strategy for Sustainable and Circular Textiles

The 2020 EU Circular Economy Action Plan[38] identified the textile sector as a key product value chain with an urgent need for sustainable transition due to the environmental and climate impact of the sector, as well as the limited existing recycling of textiles. In light of these challenges, the European Commission proposed a comprehensive EU Strategy for Sustainable and Circular Textiles, which was adopted in March 2022. The strategy aims to strengthen industrial competitiveness and innovation in the sector, as well as boosting the EU market for sustainable and circular textiles. This includes the market for textile reuse, addressing fast fashion and driving new business models. Specifically, the strategy highlights the following visions for the transformation of the fashion and textile industry:

> *By 2030, textiles placed on the EU market are long-lived and recyclable, to a great extent made of recycled fibres, free of hazardous substances and produced in respect of social rights and the environment. Consumers benefit from high quality affordable textiles, fast fashion is out of fashion and economically profitable re-use and repair services are widely available. In a competitive, resilient and innovative textiles sector, producers take responsibility for their products along the value chain, including when they become waste. The circular textiles ecosystem is thriving, driven by sufficient capacities for innovative fibre-to-fibre recycling, while the incineration and landfilling of textiles is reduced to the minimum.*[39]

The strategy sets out several initiatives for adoption in EU legislation and thus for future implementation in all EU member states, as summarized in Table 2 below.

38. European Commission (2020) Circular Economy Action Plan: For a cleaner and more competitive Europe.
39. European Commission (2022) EU Strategy for Sustainable and Circular Textiles. COM/2022/141 final, p. 2–3.

Table 2: Key elements of the EU Strategy for Sustainable and Circular Textiles

A new pattern for Europe: key actions for sustainable and circular textiles

1. Introducing mandatory Ecodesign requirements: performance requirements for the environmental sustainability of textile products.
2. Disclosure of the number of products discarded by large enterprises and their subsequent treatment, and measures on banning the destruction of unsold textiles.
3. Initiative to address the unintentional release of microplastics from textile products.
4. Digital Product Passport for textiles with information requirements on environmental sustainability.
5. Mandatory requirements concerning green public procurement and Member States incentives.
6. Empowering consumers in the green transition and ensuring the reliability of green claims.
7. Extended Producer Responsibility and boosting reuse and recycling of textile waste.

Weaving the industry of tomorrow: creating the enabling conditions

8. Launching the Transition Pathway for the Textile Ecosystem.
9. Reversing the overproduction and overconsumption of clothing: Making fast fashion out of fashion.
10. Ensuring fair competition and compliance in a well-functioning internal market.
11. Supporting research, innovation and investments.
12. Developing the skills needed for the green and digital transitions.

Tying together a sustainable textiles value chain globally

13. Due diligence for environmental and social fairness.
14. Addressing the challenges from the export of textile waste.

Several of these elements of the EU Strategy for Sustainable and Circular Textiles are related to other cross-sectoral initiatives currently being developed. In the following we provide a brief overview of the ones most relevant to the textile sector in the near future.

Ecodesign for Sustainable Products Regulation (ESPR)

The proposal for a new Ecodesign for Sustainable Products Regulation[40], published in March 2022 establishes a framework to set ecodesign requirements for specific product groups to significantly improve their circularity, energy performance and other environmental sustainability aspects. It will enable the setting of performance and information requirements for almost all categories of physical goods placed on the EU market. The framework will allow a wide range of requirements to be set,

40. European Commission (2022) Proposal for a Regulation establishing a framework for setting ecodesign requirements for sustainable products and repealing Directive 2009/125/EC. COM/2022/142 final.

including on product durability, reusability, upgradability and reparability, presence of substances that inhibit circularity, energy and resource efficiency, recycled content, remanufacturing and recycling, carbon and environmental footprint information requirements, including a Digital Product Passport. The Digital Product Passport should help consumers and businesses make informed choices when purchasing products, facilitate repairs and recycling and improve transparency about products' life cycle impacts on the environment. It should also help public authorities to better perform checks and controls. The specifics of the Digital Product Passport will be decided in the product-specific delegated act, meaning that specifics regarding, for example, data carrier technology, environmental data and disclosure level will be adapted to the specific need and possibility affiliated with the regulated product group. Textiles are anticipated as one of the first product groups to be regulated under this new ESPR framework.

Product Environmental Footprint (PEF) and Green Claims

The European Commission initiative on Green Claims aims to increase the reliability, comparability and verifiability of environmental claims about products through requirements that such claims be substantiated and verified using lifecycle analysis methods, including the European Commission's Product Environmental Footprint (PEF) method.[41] The PEF method has been developed since 2011 by the European Commission with the involvement of experts, member states and other relevant stakeholders. It is built on existing, internationally accepted practices, indicators and rules for lifecycle analysis methods and enables companies to measure and communicate the environmental performance of their products and thereby compete on the market based on reliable environmental information. PEF Category Rules have been developed for some product categories and are currently under development for apparel and footwear.

Extended Producer Responsibility (EPR)

The Commission plans to propose harmonized EU extended producer responsibility (EPR) rules for textiles as part of the forthcoming revision of the Waste Framework Directive in 2023.[42] With the aim of creating an economy for collection, sorting, reuse and recycling and to ensure that products are designed for circularity, the Commission suggests that a significant share of contributions to EPR schemes is dedicated to waste prevention measures and preparation for reuse. The Commission is also considering requiring that separately collected textile waste from households and household-like waste is prepared for reuse as a first step to boost reuse-and-repair activities and reduce waste volumes.

41. European Commission (2021) Commission Recommendation (EU) 2021/2279 of 15 December 2021 on the use of the Environmental Footprint methods to measure and communicate the life cycle environmental performance of products and organisations. C/2021/9332.
42. European Commission (2022) EU Strategy for Sustainable and Circular Textiles, COM/2022/141 final, Chapter 2.6.

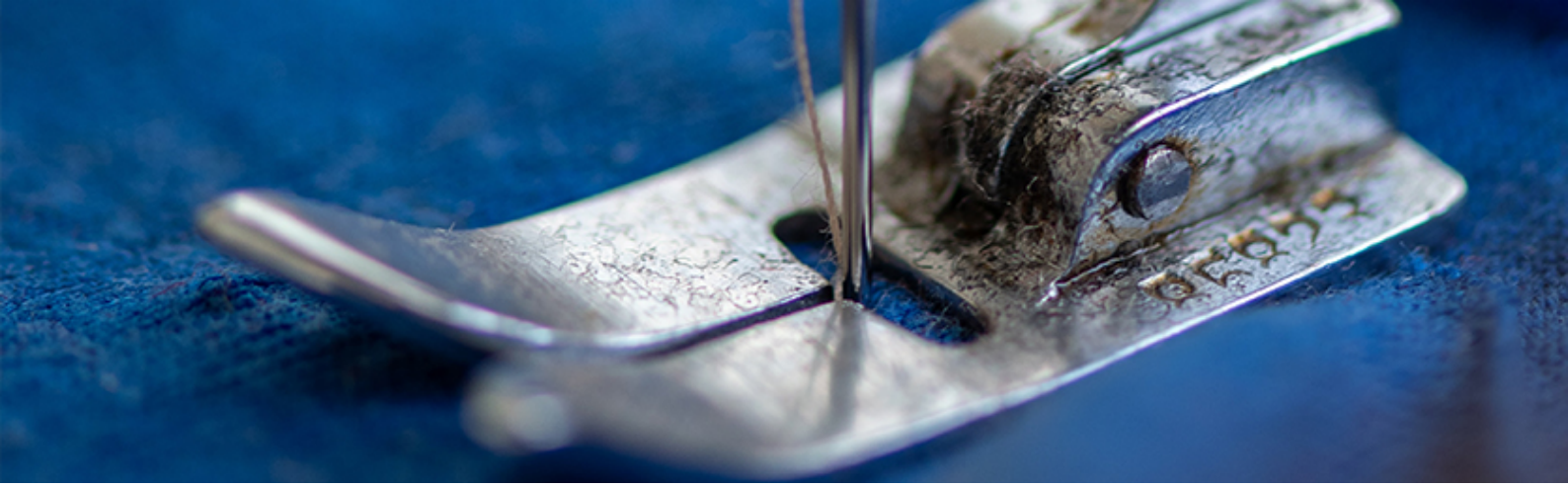
EU Chemicals Strategy for Sustainability

On 14 October 2020 the European Commission published the Chemicals Strategy for Sustainability: Towards a Toxic-Free Environment[43] as part of the European Green Deal and a key commitment to achieve the EU's zero pollution ambition. The aim of the strategy is to provide better protection of citizens and the environment, as well as boosting the innovation of safe and sustainable chemicals. A key action of the strategy is to ban the most harmful chemicals in consumer products. The Commission strives to minimize the presence of chemical substances of concern in products by enforcing requirements, e.g., as part of the Sustainable Product Policy Initiative. Priority will be given to product groups with the highest potential for circularity, including textiles. In addition, the aim is to boost investment and innovation for the production and use of chemicals that are safe and sustainable, e.g., by funding sustainable innovations able to decontaminate waste streams in order to achieve the safe recycling of products, including textiles.

3.4 Sum up

This chapter has described existing and expected future legislation regarding textiles at national and EU level, thus providing an overview of the changes the Nordic fashion and textile sector need to accommodate in the coming years. It is clear that the Nordic countries are developing and implementing several regulatory tools and frameworks to stimulate circularity in the fashion and textile industry and to prepare for existing and upcoming EU requirements. In the following chapter, we present findings from our mapping of sustainable textile initiatives in the Nordic countries to pave the way for a broader discussion about the state of the art in the Nordic countries and to identify needs for joint action.

43. European Commission (2020) Chemicals Strategy for Sustainability Towards a Toxic-Free Environment. COM/2020/667 final.



Chapter 4: Sustainable textile initiatives in the Nordic countries

This chapter presents findings from our mapping of current Nordic initiatives on sustainable fashion and textile. The focus is on collaborative projects initiated in recent years by both private and public actors that innovate the textile sector as a whole in a more circular direction. Based on this criterion, 148 projects have been included in the mapping.[44] The projects are divided into five overall categories:

1. Materials and design
2. Production methods
3. Consumption and circular business models
4. Collection, sorting and recycling
5. Governance and capacity building

The first category, "Materials and design", includes projects addressing the need for sustainable materials and designs, including the use of recycled fibers. The second category, "Production methods", comprises projects that experiment with new ways of producing textile and clothing, whereas the third category, "Consumption and circular business models", involves projects that seek to guide and regulate consumer behavior and support the uptake of new, circular business models. The fourth category, "Collection, sorting and recycling", encompasses projects that are developing new collection and sorting systems for reuse and recycling, as well as plants for sorting and recycling textile products. The fifth category, "Governance and capacity building", covers projects that test or implement tools for generating circular infrastructures and competences.

The categories thus reflect the core focus of the projects. Some of the projects overlap, i.e., they address more than one aspect of the textile value chain, but common for most of the projects is that they have a core focus, for instance, on materials, design or sorting. In the fifth category, "Governance and capacity building", we have gathered projects that cut across all parts of the textile value chain. Hence, our grouping of the projects into these five categories primarily works as a tool for establishing an overview of all the important and relevant activities going on in the Nordic countries.

44. See Appendix 1: List of projects and initiatives in the Nordic countries.

In the following, each category will be analyzed with emphasis on identifying main trends.

4.1 Materials and design

Materials

The production of materials for the textile production is associated with a heavy use of resources and a substantial environmental footprint due to the use of water, land for the growth of natural fibers and the extraction of resources for petrochemical textiles.[45] There is a need to develop materials with a lower environmental footprint, and find ways to use existing materials more than once and in more effective ways.[46] Furthermore, with textile production becoming increasingly globalized during the past decades, knowing the origin and associated environmental impacts of the materials can be difficult.[47] In our mapping of initiatives in the Nordic countries, we identified three overall trends for initiatives aiming to support a sustainable textile economy through choices concerning materials:

- Using locally available materials
- Using surplus or residual materials
- Using recycled materials

Using locally available materials

To address the environmental impact related to the production of materials, these projects utilize locally available resources to produce more sustainable materials for textile production whilst also aiming to create local economic growth, business opportunities and local jobs. Most prominent in this category is the use of wood to produce cellulose or paper yarn-based textiles, especially in Finland and Sweden, but with projects taking place in Norway and Denmark, as well. A niche alternative to wood-based fibers is locally grown hemp, which is seen as a potential resource due to the reduced use of water and land compared to cotton production.

Projects identified (6):

Forest fabrics (SE)
Fra trær til klær (NO)
Hemp4Tex (DK)
Styvhetsmekanik för pappersgarn (SE)
Textile fiber from paper-grade pulp (FI)
The Grete project (FI)

45. UNEP (2020) Sustainability and Circularity in the Textile Value Chain: Global Stocktaking.
46. UNEP (2020) Sustainability and Circularity in the Textile Value Chain: Global Stocktaking.
47. For an account of the global textile value chain, see Ellen MacArthur Foundation (2017) A new textiles economy: Redesigning fashion's future.

Using surplus- or residual resources

The trend of focusing on locally available resources is also evident in projects using surplus or by-products. Some of these projects also address the challenges related to conventional fibers, e.g., cotton, and look into using wood-based cellulose fibers instead. However, as wood also has many other usages, other sources of cellulose are being explored, e.g., surplus biomass and regenerated textile fibers. The usage of other surplus products is being explored as well, e.g., the use of food waste for the production of fungal textiles, thus addressing the challenges of wasted food at the same time. Furthermore, projects are exploring residual products as a new resource. Some of the streams in question are agricultural waste, residuals from the production of food and from the hemp industry, as well as recycled cardboard. A niche alternative to the production of cellulose from surplus or residual streams is the use of Swedish wool as a by-product from the production of meat. The wool would otherwise have been discarded, while large quantities of wool are being imported for economic reasons, and this solution hence addresses the question of resource effectiveness.

Projects identified (7):

Bio-based residual streams with potential in the technical textile industry (SE)
Circular cellulose to textile fiber production (SE)
ExpandFibre (FI)
Grønne Hoser: Bæredygtigt alternativ skal erstatte cellulose fra træ (DK)
Sustainable Fungal Textiles: a novel approach for reuse of food waste (SE)
TexChain (SE)
The Swedish Wool Initiative (SE)

Using recycled resources

Another approach to addressing the challenges of finding more sustainable materials is using recycled textile fibers for the production of new textile products. This supports the work on scaling recycling facilities and making the fashion industry more circular. The identified projects explore the possibilities and address the challenges related to textile recycling, e.g., creating high-performance and high-quality textiles with recycled textile fibers. Across the projects, both mechanical and chemical recycling are examined, as well as bio-based and fossil-based textile fibers, with cellulose and polyester being prominent. In Norway, recirculation of wool is also examined. Across the projects, both fibers made from 100 percent recycled materials are looked into as well as the combination of recycled fibers and sustainable virgin fibers and how to spin and mix fibers to achieve high-quality sustainable products. The identified projects look into technical challenges of recycling as well as create sustainable and feasible business models for recycled fibers.

Projects identified (14):

CircleStretch (SE)
Circular tee (SE)
Circular Textile Innovations (SE)
Circulose dress (SE)
Closed-loop recycling of wool/synthetic blend textiles into high-end textile fibers (SE)
Fra ull til gull (NO)
Innovative fiber blends and yarn spinning techniques (SE)
Investigating wool keratin chemical recycling as a part of applying a circular business approach (NO)
Ioncell (FI)
New cotton project (FI)
Recycling of health care textiles, including single use garments (SE)
Textiles, back to textiles (SE)
TRT prosjektet (NO)
Toward sustainable textiles: Bio-based thermoplastic fibers with chemically recyclable acetal structure (SE)

Design

A significant challenge to achieving a more sustainable textile economy is related to the design phase. This relates to both the waste generated during textile production and the challenges related to recycling textiles with design features making them difficult to recycle.[48] A lot of textiles placed on the market are not made to have a long lifespan, posing a big challenge due to the large environmental impact associated with the production of any textile, regardless of its lifespan.[49] This can either be due to poor quality or items not being designed with aesthetic longevity in mind.[50] Within the identified projects, these challenges are primarily being addressed by:

- Designing for recycling
- Designing for lifetime extension
- Minimizing waste through efficient use of materials

Designing for recycling

A number of projects look into how textiles can be designed in a manner that makes them recyclable. In these projects, the focus is on developing design guides for sustainable textile products and phasing out substances that are not suited to the recycling technologies of the future. Other projects in this category focus on using mono-materials and using materials for the entire garment (labels and threads

48. UNEP (2020) Sustainability and Circularity in the Textile Value Chain: Global Stocktaking.
49. UNEP (2020) Sustainability and Circularity in the Textile Value Chain: Global Stocktaking.
50. UNEP (2020) Sustainability and Circularity in the Textile Value Chain: Global Stocktaking.

included), enabling full recyclability of the garments and ensuring that add-ons do not need to be removed before recycling the garment. Other projects investigate how textiles can be designed in order to close the loop, by designing for recycling and designing products using recycled materials. With the focus on workwear, one of these projects also addresses the challenge of upscaling the textile recycling capacity. Another approach focuses on the combination of designing for circularity and developing circular business models with the specific focus on fashion textiles, thus addressing both the large challenges and the big potential for resales.

Projects identified (6):

Design & Cirkularitet (DK)
Monomaterial Loungewear (SE)
Recyclable workwear (SE)
ReSuit (DK)
Showpiece: Paper dress (SE)
The collection of tomorrow (NO)

Designing for lifetime extension

Some projects focus on the functional lifetime of garments, textiles and clothing by looking into enhancing quality and comfort. Other projects evolve around the aesthetic lifetime of garments and some projects focus on both. One of the identified projects is investigating how to improve the aesthetic lifetime of textiles by making improvements on compromised garments. Another project evolves around creating garments designed to last a long time by enabling repairs, as well as redesigning or updating clothes. Furthermore, one project focuses on how to design clothes in a manner that makes repairing them more appealing, and which aesthetics support this goal, thus extending the lifetime of the textiles.

Projects identified (5):

LASTING (NO)
Mending the future: wisdom, memory and emotional bonds with our clothes (DK)
Re:Set (SE)
Re:Textile (SE)
Workwear for health care (SE)

Minimizing waste through efficient use of materials

These projects address the question of resource optimization in different ways, e.g., by remaking and redesigning leftover products and products returned due to complaints, into new products. Another approach is to reduce the use of materials in the design phase by using specific knitting techniques when producing garments.

Projects identified (3):

Re:Craft (SE)
Re:Gina (SE)
Structures in wool (SE)

4.2 Production methods

Looking through projects targeting the sustainability and circularity of the production phase, we discovered three overall trends:

- Local production of textiles
- Digital demand-driven production
- Optimizing dyeing and finishing processes

Local production of textiles

To curb the negative impact of the fashion and textile industry, these projects emphasize how smaller, local textile production setups can minimize logistics in connection to product development, material collection and transportation. The idea is to customize and localize production in the Nordic countries to reduce environmental impact. The projects test how increased digitalization and new automated production processes can boost the competitiveness of sustainable local solutions and collaborations. In this way, the projects facilitate digital transformation of the industry by exposing companies to new technology, new machines, transformation towards cloud services and artificial intelligence (AI) as essential stepping-stones towards developing and optimizing economically viable, local production.

Projects identified (3):

CircularMovement (SE)
Mikrofabriker (SE)
Rodinia Generation (DK)

Digital demand-driven production

This group of projects targets overproduction while curbing time- and resource-consuming design phases, utilizing digital, demand-driven production, pushing the industry from the concept of "make to sell" to the concept of "sell and then make". To enable this transition, the projects set out to digitalize current analog systems in design, marketing, sales, customization and testing. They do this by developing a demonstrator for virtual design and sales to remove overproduction and reduce return rates to as low as one percent, for example, by using programs for digital, virtual prototyping. Similarly, some projects show how 3D-knitting allows agile prototyping and production of single products, as the technology enables fast, switchable production, making it easy to customize products, while reducing production time and resources needed.

Projects identified (5):

3D Fashion Design Simulation (SE)
CLO3D Virtuel Design og Konstruktion (DK)
DIGIMODE: DIgitally enabled, demand driven local fashion value chains (SE)
Knit2sit - 3D strikket møbel-polster (DK)
Virtual Stage: Fashion Furniture Forward (DK)

Optimizing dyeing and finishing process

Aiding in reducing the use of water, energy, chemicals and waste production in the dyeing and finishing process, this group of projects emphasizes the development for more sustainable dyes, while developing and optimizing dyeing methods and printing technology. Several projects focus on replacing synthetic dyes with bio-based dyes by investigating side streams from the food and forest industry as sources of dyes, as well as bacteria and algae dyes. While developing natural-based dyes, the projects test dying techniques, durability and color longevity under different conditions. An example is the development of bio-indigo.

Projects identified (7):

Bacteria pigment. New textile design methods in a sustainable realm (DK)
Biocolour (FI)
Bæredygtige farvestoffer og farveprocesser (DK)
Development of a digital printing process with sustainable inks for functional clothing (SE)
Mounid - algbläck för textilinfärgning (SE)
Ny og grønnere produktion af indigo til farvning af jeans (DK)
Yarn-dyed dress (SE)

4.3 Consumption and circular business models

This group of projects addresses aspects of consumption and circular business models. Products are often consumed without being worn out, not used enough or not used at all due to the tradition and culture of overproduction and -consumption.[51] Therefore, several projects in the Nordic countries aim at changing means of consumption. This includes reduction of consumption, new modes of product utilization, and changes in purchasing practices. The projects tackle the subject from different perspectives, such as the perspective of companies, consumers, and public authorities. We have identified the following four main areas of activities:

- Public procurement
- Repair
- Take-back schemes and second-hand sales
- Consumer consciousness and demands

Public procurement

As public procurement totals a significant amount of national consumption, public authorities can influence the means of production by producers and suppliers through their demand.[52] In addition, public procurement may set a precedence for other purchasers. These notions were highlighted in four initiatives identified in the mapping. They demonstrate a motivation for public authorities to play an active role in the green transition.

51. McKinsey Sustainability (2016) Style that's sustainable: A new fast-fashion formula.
52. See e.g. European Commission (2017) Making Public Procurement work in and for Europe. COM/2017/572 final.

Projects identified (4):

Hållbarhetskriterier för inköp av textil (SE)
Indkøb og forbrug af cirkulære tekstiler i Region Hovedstaden og Københavns Kommune (DK)
KEINO (FI)
Strategi for grønne offentlige indkøb (DK)

Repair

Another trend is to extend the products' lives through repair. By repairing products, production of new products is prevented. The repair solutions the projects represent are either aimed at making it easier for consumers to repair their products themselves or for businesses to have in-store repair systems when receiving product complaints. For instance, one system solution is based on digitalizing and automating the current delivery/receiving process of clothing between clothing store and tailor. The projects in this group demonstrate that information and communication technologies can support circularity by facilitating coordination and a digital infrastructure for repairs.

Projects identified (3):

Automatisering af reklamationer på tøj og håndtering heraf (DK)
REFASHION INFRASTRUCTURE (NO)
Repair Patch System (SE)

Take-back schemes and second hand sales

Repairs prevent a product from prematurely becoming waste by ensuring the product's functionality. However, when consumers stop using a product, circular models strive to ensure that the product remains in use through other means. Accordingly, several projects seek to recirculate the product after the consumer has discarded it. This includes projects that take back products in order to rent, lease or resell them as second-hand clothes. However, take-back schemes, renting, leasing and purchasing of second-hand products also require customers to change behavior, including being willing to wear second-hand clothes. Hence, two of the projects also focus on identifying and generating knowledge about the challenges of product-as-a-service models, in which customer preferences play a vital role.

Projects identified (5):

Circuit (SE)
Re-design creating both ecological, financial and social sustainability (SE)
Paas Pilots - Product as a Service pilots (FI)
Snowroller (NO)
Take-back af tekstiler (DK)

Consumer consciousness and demands

A group of projects test the hypothesis that growing consciousness among consumers about the environmental impact of fashion and textiles will result in higher demands for products that are environmentally friendly. One project set out to investigate how nudging can enable consumers to make less environmentally harmful decisions without feeling restricted. Other projects develop information campaigns and establish social media platforms that consumers can consult to gain knowledge and inspiration about sustainable consumption. Common to many of these projects is the wish to empower and activate citizens to make more sustainable choices.

Projects identified (10):

Commercialization of a full service circular business model for influencers to establish and invest in sustainable brands (NO)
F/ACT Movement (SE)
Hallå Konsument! Textil och miljö (SE)
Mindset Growth. A Campaign (SE)
Minimeringsmästarna (SE)
Oslo_Unbranded: Et dytt i riktig retning for verdiskapning og bærekraft i klesindustrien (NO)
Opplysningskontoret Tekstilaksjonen (NO)
Stop Tøjspild (DK)
Tekstilrevolutionens certificeringsværktøj (DK)
Textilsmart (SE)

4.4 Collection, sorting and recycling

This group of projects addresses aspects of collection and treatment of textile waste and focus on knowledge gathering, technology development and the establishment of facilities in the interest of both municipalities and other actors sorting or treating the collected material for reuse and recycling. There are four overall trends:

- Municipal knowledge gathering
- Sorting techniques and technologies
- Recycling techniques and technologies
- Plants and processing facilities

Municipal knowledge gathering

To overcome existing knowledge gaps, the projects aim to collect and produce knowledge on best practices and solutions in this new area. The municipalities investigate how textile waste can be collected, what challenges they face, the need for manual and automated sorting, and how to ensure the best quality resource for recycling. The information sharing aspect is stressed in several projects and highlights a need for increased knowledge at the municipal level. There seems to be a trend in projects aiming to create guidelines or specifications on requirements for municipalities and other organizations collecting and sorting textiles. A few projects also go beyond the quality of collection and sorting and further examine the need for better municipal tenders for textile waste management or the training of textile sorters in machine handling and manual sorting.

Projects identified (5):

En klespilot (NO)
Tekstilaffaldspartnerskabets udbudsprojekt (DK)
Tekstilaffaldspartnerskabets vidensbanksprojekt (DK)
Tekstilaffaldspartnerskabets værdikædeprojekt (DK)
Telaketju YM (FI)

Sorting techniques and technologies

Today, sorting of textiles is mostly undertaken manually, which is costly in terms of both time and manpower. To manage the foreseen amounts of collected textiles and textile waste, a number of projects focus on new and innovative techniques for sorting textile waste. In the case of sorting, there is a focus on automated solutions that make it easier to process large amounts of textile waste while decreasing the need for manual labor. The projects test how sensors and robotics can provide the needed automation. One project uses artificial intelligence and machine learning to create a more efficient and quality-assured sorting step. Like the majority, it focuses on sorting textiles into smaller fractions for the purpose of reuse or recycling. Another project has instead looked at the residual waste stream to examine whether textiles can be removed from this fraction and utilized for recycling.

Projects identified (3):

AI for resource-efficient circular fashion (SE)
NewRetex - Digital sortering og processering af kasserede tekstiler (DK)
Re:textiles (NO)

Recycling techniques and technologies

Several projects have identified the need for developing new recycling techniques and technologies that can recycle textile waste for different applications. Some of the projects focus on mechanical recycling into everything from non-woven insulation and acoustics products to composites that can be used to make table tops, furniture, musical instruments and much more. Two projects in this mapping looked at direct mechanical fiber-to-fiber recycling, while another focused on creating the right mix of recycled and virgin fibers to ensure a durable tread. Another group of projects investigates how chemicals can be used as a new method for handling mix-fractions like poly-cotton that were previously hard to recycle. Chemicals are also used to treat man-made cellulose fibers and examine how they can be recycled into new fibers, packaging and building blocks for the chemical industry.

Projects identified (11):

3D støbning i upcycled tekstilaffald (DK)
Carpet-ZeroWaste (DK)
Chemical recycling of man-made cellulose fibers (SE)
Foot Plug (SE)
Från textil till dissolvingmassa, igen (SE)
Den Cirkulære Tekstilindustri (DK)
Den cirkulære tekstilløsning (DK)
Mekanisk Textilåtervinning (SE)
RE:MIX III: Chemical recycling of synthetic textile blends (SE)
Separation af blandingstekstiler (DK)
TWOOD (SE)

Plants and processing facilities

Many actors have identified the need for large-scale plants and processing facilities when the collection of textile waste is going to increase in relation to the EU's 2025 requirement. This has sparked several projects aiming to design and run pilot plants or full-scale processing plants in the Nordic countries.[53] These mainly include sorting plants, but also recycling facilities and sometimes a combination of both. Most take a cautious approach and start with projects that investigate the feasibility and potential business plans of a processing plant in the region in question. Afterwards, there are projects aimed directly at the construction and operation of pilot plants that can provide practical experience in sorting. Finally, the projects evolve into full-scale plants that aim to process much of the textile waste from the region or country. The projects share a keen interest in automation and collection of data on the fiber and chemical content of textile waste.

Projects identified (5):

Mechanical textile recycling - Roadmap for Swedish processing capacity (SE)
SIPTex (SE)
Sorteringsanlegg for brukte tekstiler (NO)
Telaketju AIKO (FI)
Telaketju TEM (FI)

53. Research and development in this field happen worldwide. For an overview of recycling plants and technologies from a global perspective, see Jørgensen et al. (2022) Research and identification of textile plants globally – focusing on fiber-to-fiber recycling for the fashion & textile industry.

4.5 Governance and capacity building

To stimulate circularity in the textile economy, there is a need for building circular infrastructures and capacities.[54] In the Nordic countries, several projects have been initiated to meet this need. These projects create and facilitate collaboration across sectoral and institutional boundaries by setting up new types of networks, partnerships and platforms that allow for the sharing and development of knowledge, as well as the experimentation and implementation of new governance tools. There are four overall trends:

- Exchanging existing knowledge
- Generating new knowledge
- Experimenting with new tools
- Training and education

Exchanging existing knowledge

Several of the projects find that the exchange of existing knowledge is an essential stepping-stone towards achieving circularity in the textile economy. To enable the exchange of knowledge, the projects are setting up networks and partnerships where stakeholders from all parts of the value chain meet on a regular basis. This could be as part of conferences and seminars to update and inspire each other, as well as developing an interdisciplinary/cross-sectoral understanding of what a circular economy means in a fashion and textile context. Some of the projects go further by creating and managing new digital platforms, which provide access to specific breakthroughs in the area of managing a circular economy, including new materials, new production technologies and novel scientific data.

Projects identified (13):

Bæredygtige elastiske materialer (DK)
Bæredygtige funktionelle tekstiler (DK)
Bæredygtige kredsløb i tekstilbranchen (DK)
Bæredygtige materialer - biopolymerer 2.0 (DK)
CircDNet project (FI)
Circular Hub (SE)
Dialog för en hållbara textile värdikedja (SE)
Digitalt Partnerskab: ansvarlig produktion (DK)
New material pathways (DK)
Tekstilsymbiosen Herning (DK)
Textildialogen (SE)
Textile design method for future-proof up-cycling (SE)
Textile & Fashion 2030 (SE)

54. Ellen MacArthur Foundation (2020) Financing the circular economy – Capturing the opportunity.

Generating new knowledge

The second trend includes projects that conduct research to fill knowledge gaps and to inform new initiatives. The projects investigate various issues, such as the role of design practices in the lifetime of textile products; how and when textiles go out of use; how textile waste is treated; which barriers to circularity exist from the perspective of different stakeholders; the effects of e-commerce and logos on consumption; and the forms of business models, regulations and communications needed to support the transition. The projects apply different methods, including mapping, questionnaires, interviews, case studies, conceptual analyses and mixed-methods research designs.

Projects identified (19):

CHANGE: environmental systems shift in clothing consumption (DK, NO, SE)
CICAT2025 (FI)
CLOSeD (SE)
FINIX (FI)
Framtidens hållbara kläder (SE)
Logistikens roll i det cirkulära textila ekosystemet (SE)
Mistra Future Fashion (SE)
Project recycling (DK)
ReYarn (DK)
Sirkulære tekstiler (NO)
Sustainability in education for clothing designers and textile artists (NO)
Telaketju 2 BF (FI)
Telaketju Tekes (FI)
Telavalue BF (FI)
Textile 2025 (NO)
Wasted Textiles (NO)
SATIN (DK, FI, NO, SE)
SCArCITY - Scaling Circular Business Models in Cascaded Systems: Paradoxes, Strategies and Metrics in Clothing and Textile Industry (SE)
Smart Textiles (SE)

Experimenting with new tools

A third trend is to experiment with new tools and instruments that help structuring sustainability information of products from a lifecycle perspective, thus inventing and testing different governance approaches relevant for a circular textile economy. Some projects test how to support companies towards achieving a sustainability certification, whereas other projects experiment with the use of blockchain and similar technologies, not only to trace the life of products, but also to collect and share data on their environmental impact.

Projects identified (7):

Blockchain og Iot som en katalysator for fremtidige cirkulære forretningsmodeller (DK)
Connect Me (SE)
Design Intelligence Simulator (NO)
Digitalization of traceability in textile production (SE)
Framework for Circular Textiles - Classification of recycled textiles and criteria for circularity (SE)
Gina Lab Transparency Project (SE)
Taskforce for bæredygtig omstilling af dansk mode og tekstil og grøn certificering af SMV'er (DK)

Training and education

Finally, several projects see a need for developing and implementing training schemes and educational material to enhance the competences of different groups in the textile value chain and thereby ease the transition towards circularity. Most projects focus on training and education of designers, producers and company owners, but there are also projects that train and educate consumers (see section 3) and projects that seek to build competences for actors in the collection and sorting area (see section 4). Initiatives in this category include the issuing of guidelines, and offering educational courses, seminars and other learning platforms.

Projects identified (7):

Bæredygtig produktion og sporbarhed af dansk design og produkter via Blockchain og IoT (DK)
Design Lab (NO)
Kompetanseheving innen bærekraftig design og produktutvikling (NO)
Leverandørdialog og Verdensmål for SMV'er i mode- og tekstilbranchen (DK)
Manufacture Oslo (NO)
re:skills (SE)
SUSTAINABILITY: Innovation and restructuring (NO)

Chapter 5: Involvement of stakeholders

In August 2022, the Danish Environmental Protection Agency and the Danish Ministry of Environment brought together actors representing the Nordic fashion and textile sector for an online workshop associated with The Nordic Textile Collaboration. Participants included representatives from trade associations, recycling and waste management companies, reuse organizations, consumer organizations, academia, NGOs and public authorities. In total, around 100 participants provided input for the project during the workshops.

The aim of the workshop was twofold:

- Gaining insights on existing initiatives and projects on sustainable textiles within the Nordic countries, thus contributing to and providing quality assurance for the mapping presented in Chapter 4.
- Brainstorming on selected initiatives for The Nordic Textile Collaboration to launch in 2023 and 2024, thus providing input for Chapter 6, and presenting proposed initiatives for the future work of The Nordic Textile Collaboration.

The workshop was repeated three times with the same content to accommodate more participants. In this way, we obtained input from a large group while accommodating smaller groups during each workshop, which made it possible for all participants to express their opinion.

All three workshops began with a plenary presentation about The Nordic Textile Collaboration with a focus on the overall goals of the project. The workshops were then organized with two breakout sessions, during which the participants were divided into five groups based on the five categories presented in Chapter 4:

1. Materials and design
2. Production methods
3. Consumption and circular business models
4. Collection, sorting and recycling
5. Governance and capacity building

Group formation for the breakout sessions was randomized in order to push the

participants to think circular and outside of their area of expertise. Furthermore, the randomization of the groups provided an opportunity for the participants to establish a dialogue across countries and organizations.

During the first breakout session, the groups addressed the question, "*Which current initiatives do you view as the most important in order to achieve a circular textile economy?*" In the breakout rooms, participants were asked to list known projects or initiatives addressing their allocated theme. During the second breakout session, the groups addressed the question, "*Which initiatives should be the focus of the Nordic Textile Collaboration in 2023 and 2024?*". The groups were asked to brainstorm initiatives and agree on two initiatives to bring forward in the plenary sum-up, where the total of 10 proposed initiatives were put to a vote. After both breakout sessions, the participants had the opportunity to provide input for all themes during a plenary discussion, where ideas and reflections were shared in a lively debate.

With the participation of approximately 100 active actors with their different expert knowledge of the Nordic fashion and textile sector, the three workshops provided a wide array of input for both the mapping of current initiatives, as well as a discussion on the relevant next steps of The Nordic Textile Collaboration.

In total, the workshop resulted in a list of 25 projects to be added to the preliminary mapping done by the Danish EPA. These projects have been included in Chapter 4. In this way, the workshop helped to quality assure the mapping. The total list of ideas for initiatives generated by both break-out sessions and plenary discussions have served as inspiration for the recommendations in Chapter 6. In the following, we briefly present the most discussed themes during the workshops:

Education and competence building

- Education that addresses the need for developing new competencies on circularity and sustainability for both consumers and employees in the fashion and textile industry.

Consumption and cultures of textile use

- Invent and implement new business models for fashion and textiles.
- Initiatives that slow down fast fashion by extending the functional and aesthetic lifetime of textiles.
- Make consumers aware of their role in the circular transition and stimulate active citizenship.

Sorting and preparation for reuse

- Address challenges related to sorting in households through guidelines on how to distinguish between reusable textiles, recyclable textiles and textiles that go into the residual waste stream.
- Develop new methods for sorting with focus on both reuse, recycling and preparation for reuse.

Development of new technologies and a market for recycled textile fibers

- Support the innovation of new technologies enabling a complete value chain and market for recycled materials and products.
- Funding of innovation projects and regulation supporting the uptake of recycled materials.

Improved data collection

- Address the need for improved data from the different parts of the textile value chain in order to make informed decisions.

Cross-Nordic collaboration, alignment and knowledge exchange

- Closer collaboration across the Nordic countries in order to build on existing knowledge and initiatives, utilizing the strengths of each country for joint Nordic action.
- Common guidelines on how to communicate in a uniform manner about sustainable textiles to make it easier for consumers to make informed purchases.
- Collaboration on meeting future EU demands.
- Collaboration on developing initiatives that level the playing field for actors within the fashion and textile industry, such as joint reporting and data traceability systems for textiles.

With the workshops, a very important initial dialogue has thus begun between actors across the Nordic countries and across the Nordic fashion and textile sector. The aim of The Nordic Textile Collaboration is to ensure that this dialogue continues.

Chapter 6: Concluding remarks and recommendations

The challenges of the global textile production and consumption are various and complex, and there are no easy solutions. As highlighted in Chapter 1, the activation of all actors across the textile value chain is required to achieve a more sustainable and circular textile economy. This is the aim of The Nordic Textile Collaboration. The Nordic Textile Collaboration aims to establish collaboration among actors across the Nordic value chain for fashion and textiles to achieve the following goals:

- Reducing unnecessary consumption.
- Extending the lifetime of textiles.
- Promoting circular business models.
- Stimulating digitalization and traceability in the fashion and textile industry.
- Supporting increased and improved collection, sorting, reuse, and recycling of textiles.

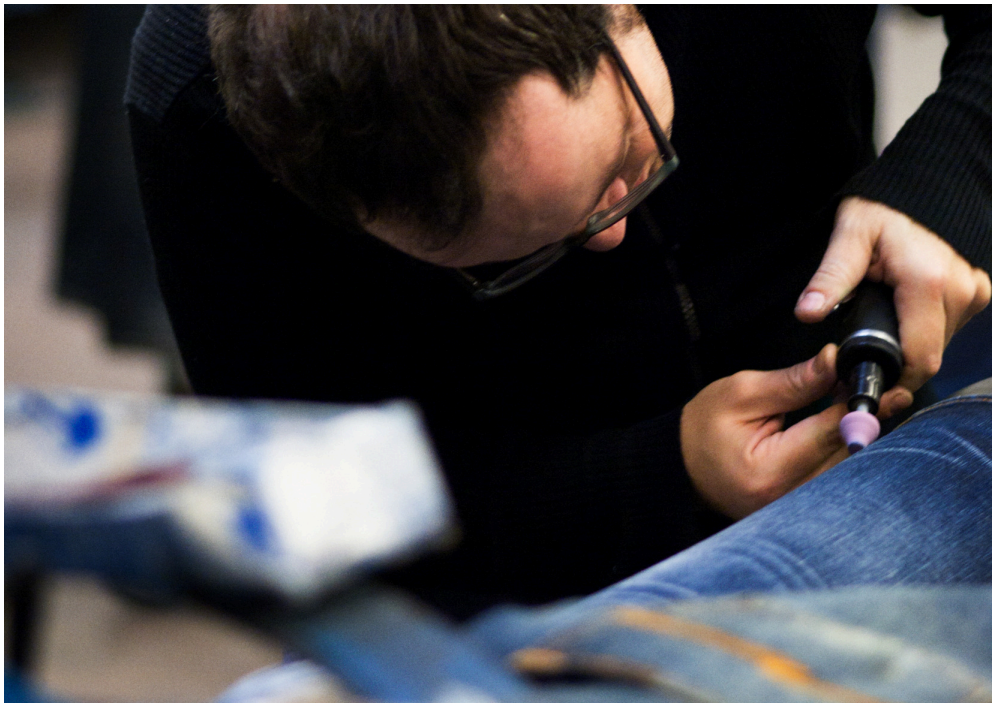
Our mapping shows that several important steps have already been taken in the Nordic countries towards achieving these goals. However, a lot of work remains to be done. Most of the initiatives we have identified in the Nordic countries are small-scale and nationally oriented. Moving forward, it makes good sense for the Nordic countries to join forces, learn from each other and act together. Based on the trends identified through the mapping (Chapter 4) and the workshops with actors in the Nordic fashion and textile industry (Chapter 5), we see a potential for The Nordic Textile Collaboration to address gaps and build on existing knowledge within the areas of:

- **Circular business models and consumption culture:** Joint action across the Nordic countries to support the uptake of circular business models and enabling consumers to take an active part in the transition by supporting lifetime extension of textiles through repairs and resale. A potential new joint Nordic initiative in this area could benefit from establishing a direct link between companies and citizens in order for them to meet and discuss how to think and act circular. As described in Chapter 3, Nordic countries have different infrastructures when it comes to reuse, repair, resale and recycling. In comparison, consumption patterns in the Nordic countries seem to be more

similar (see Chapter 1). Bringing together citizens and companies across the Nordic countries would allow for knowledge exchange about the form and content of circular business models, including, for instance, expectations on quality and accessibility of services. Joint Nordic action on this topic could build on existing material and initiatives in the Nordic countries used for information campaigning and related events that seek to teach companies and citizens how to think and act circular, mapped in Chapter 4 (and especially those under section 3).

- **Circular competences and knowledge sharing**: Developing green skills and sharing knowledge related to the transition of the fashion and textile industry to ensure that new knowledge and technologies are communicated across the Nordic fashion and textile industry. A potential new joint Nordic initiative could offer an arena for the local and national partnerships already established on textile waste management, circular business models, and/or second-hand retail to meet and share information about barriers to their practices and together generate solutions. It could organize webinars and workshops on specific topics, such as how to use new types of sustainable materials; how to design for lifetime extension; how to reduce waste; how to do production on demand; how to work with Blockchain technologies; or how to communicate circularity to suppliers or the public at large. As shown in Chapter 4, there are a great number of small-scale projects on these issues deserving attention (see sections 1, 2 and 4). Thus, there is a possibility to enhance these efforts by bringing them together in a Nordic initiative, thereby supporting an increased exchange of knowledge across the Nordic countries.

- **Collaboration on digital tools and communication**: Nordic collaboration on sustainability reporting to develop methods for communicating sustainability efforts. As described in Chapter 1, there is a widespread concern among companies about greenwashing. With unreliable green claims making it difficult for consumers to make sustainable decisions and companies having a hard time communicating green efforts in a transparent and meaningful way, there is still work ahead. A possible new joint initiative could be to establish a Nordic forum for discussing activities supporting green claims, e.g., how to measure the durability of textiles, how to use recycled materials in their designs without compromising the quality and durability of the products, and how to document sustainability by generating and collecting specific data. While we have identified only a few initiatives directly aimed at the matter of green claims, projects within the Nordic countries do test and develop tools for issues such as traceability and assessment of environmental impact (see Chapter 4, section 5). Hence, there is both a continued need for developing best practices on green claims and local and national projects to draw experiences from.



Together, the three areas can contribute to achieving the overall goals of The Nordic Textile Collaboration. Activating Nordic citizens and stimulating a Nordic market for repair and resale will contribute to reducing overconsumption and extend the lifetime of textiles; establishing circular competences and skills of all actors in the Nordic textile and fashion sector will strengthen the collection, sorting, reuse and recycling of textiles; and sharing methods for documenting and communicating green claims will strengthen digitalization and traceability in the Nordic fashion and textile industry.

Importantly, new initiatives launched in The Nordic Textile Collaboration would have to be coordinated with similar projects, such as sector collaborations and other types of partnerships already existing in the Nordic countries, as well as relevant projects initiated by the Nordic Council of Ministers. At the same time, new Nordic initiatives would have to align with the directions taken by the EU, including the initiatives proposed with the EU Strategy for Sustainable and Circular Textiles (see Chapter 3). In this way, The Nordic Textile Collaboration can generate valuable knowledge and input for continuous work on incentivizing and achieving the green transition of the textile sector, at a Nordic level, EU level and globally.

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Appendix 1: List of projects and initiatives in the Nordic countries

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