Report
How toxic are the textiles we consume? And how can the EU trade tools tackle it?

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January 2022

Produced at the initiative and with the financial support of Saskia Bricmont, Green MEP

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The report benefited from the contribution of Valérie Demazières.

Executive Summary

The European Union is a leader in setting high health and environmental standards for products, including clothing and textiles.

In 2006, the REACH regulation aimed at phasing out the most hazardous chemicals in the EU. The latest scientific advances and toxicological and ecotoxicological analyses show, however, limits in the application of REACH. It is estimated that more than 8.000 synthetic chemicals are used in the fashion manufacturing process.

The textile and clothing sector is a key sector that must be preserved. In 2019, the European textile and clothing industries had a turnover of 162 billion euros, employing more than 1.5 million people in 160,000 companies. Textile consumption in Europe had on average the fourth highest environmental and climate change impact from a global life cycle perspective in 2020. Only 20% of these primary raw materials are produced or extracted in Europe, with the rest extracted outside of Europe. In 2020, nearly 13 million full-time equivalent workers are employed worldwide in the supply chain to produce the amount of clothing, textiles and footwear consumed in the EU-27. In 2020, 8.7 million tons of finished textile products, worth €125 billion, were imported into the EU-27. Clothing accounts for 45% of imports in terms of volume, followed by household textiles, other textiles and footwear. This shows the global nature of the textile value chain and the high dependence of European consumption on imports.

This report examines the toxic, carcinogenic and mutagenic hazards that threaten textile workers, consumers and the environment. It concludes with trade-related recommendations complying with the WTO rules and aiming at promoting trade in textile products that would meet the European Union's health standards and requirements to the advantage of the workers all along the value chains and the consumers.

Sumary of trade-related recommendations		
	EU initiatives	**International initiatives**
Hard power	- Dedicated concrete and detailed provisions in TSD chapters	- International Accord for Health and Safety in the Textile and Garment Industry (widened scope and geographical coverage)
	- Special focus in GSP	
	- EU mirror clause	
	- Strong provisions on textile as a high risk sector in the upcoming Corporate Sustainable Due Diligence Directive	
	- Tighten REACH and align it on the objectives of the European Green Deal	
	- Take the opportunity of the revision of the Textile labelling Regulation and complete the negotiations on the Regulation on eco-design for sustainable products and on the "Unfair Practices" Directive	
	- Revision of the Union Customs Code with special attention on goods possibly subject to a mirror clause and high risk sectors	
Soft power (or no need for legislative change)	- Technical and financial assistance (via NDICI and Aid for Trade)	- WTO plurilateral statement on circular and sustainable textiles (based on the UN Alliance for Sustainable Fashion a.o.)
	- Intensification of the activities of Market Surveillance Authorities on textile products - EU-US collaboration under the Trade and Tech Council in view of a better regulation of the sector	- Ramp up EU support to the UN and World Bank-driven "Better Work" and draw lessons from "Vision Zero Fund"

Introduction

In 2019, the European textile and clothing industries had a turnover of **162 billion euros**, **employing more than 1.5 million people in 160,000 companies**. The COVID-19 crisis between 2019 and 2020 has reduced turnover by 9% for textiles as a whole and by 17% for clothing. However, the sector remains extremely dynamic. Textile consumption in Europe had on average the fourth highest impact on the environment and climate change from a global life cycle perspective in 2020. **Only 20% of these primary raw materials are produced or extracted in Europe**, the rest being extracted outside Europe. This shows the global nature of the textile value chain and the high dependence of European consumption on imports. This implies that 80% of the environmental impacts generated by European textile consumption take place outside of Europe, so this sector needs to be regulated for environmental reasons[1].

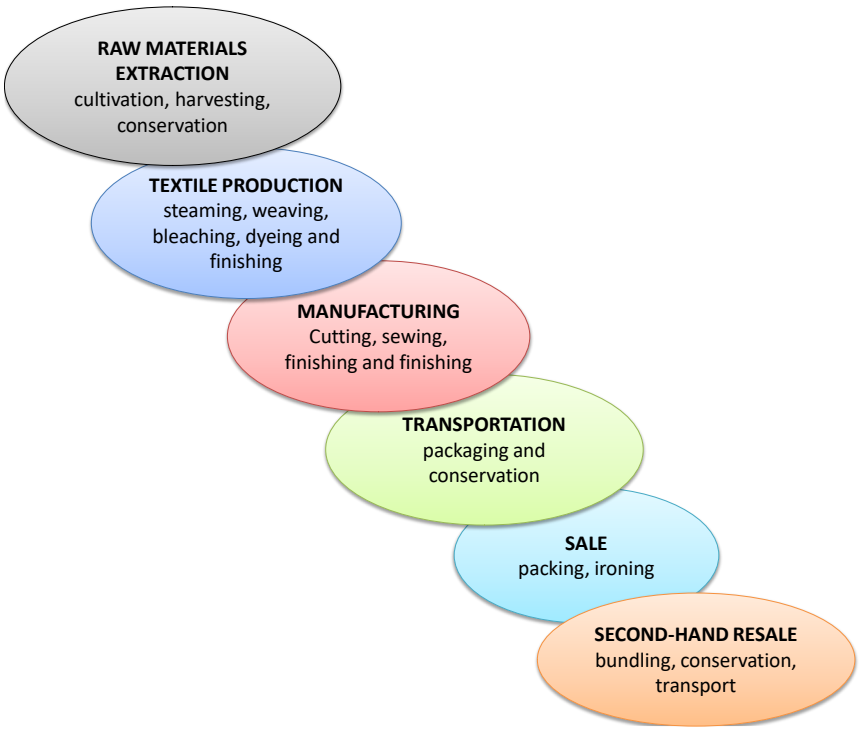
The textile sector is the third largest employer in the world after food and housing. Nearly **13 million full-time equivalent workers** are employed worldwide in the supply chain to produce the amount of clothing, textiles and footwear consumed in the EU-27 in 2020. To produce all the clothing, footwear and household textiles purchased by EU households in 2020, an estimated **175 million tons of primary raw materials were used, or 391 kg per person**. About 40% of this amount is attributable to clothing, 30% to household textiles and 30% to footwear. Europe is both an important importer and exporter of textiles In 2020, 8.7 million tons of finished textile products, worth **€125 billion, were imported into the EU-27**. Clothing accounts for 45% of imports in terms of volume, followed by household textiles, other textiles and footwear. Any regulation would have a positive impact inside and outside the EU, on millions of workers and consumers, as it is a crucial economic sector. It is a key sector that has been growing significantly for several decades and needs to be preserved[2].

According to a recent article in Nature, humans **can "ingest anywhere from a few dozen to more than 100,000 microplastics each day"** (XiaZhi 2021). What this means for human health is not yet clear, but we do know that these microscopic pieces of plastic, once in the body, travel through the bloodstream; they have been found in human placentas. To be cheaper, manufacturers use synthetic textiles that release microplastics. If they end up in the oceans, they are first in contact with the human body. The apparel, footwear and home textile industries are the main culprits. Sixty percent of the factories used to make clothing contain plastics. These

[1] https://www.eea.europa.eu/publications/textiles-and-the-environment-the/textiles-and-the-environment-the:
[2] https://www.eea.europa.eu/publications/textiles-and-the-environment-the/textiles-and-the-environment-the:

plastics are released when clothes are washed and worn, invisibly filling the oceans, covering the land, and polluting the air with tiny particles potentially harmful to human health and the environment. Plastic is not the only debatable element in today's clothing. Over **8,000 synthetic chemicals are used in the fashion manufacturing process** and end up in what we wear. Some are hormone disruptors, like phthalates, others are carcinogens like PFCs and formaldehyde. The clothes we depend on to protect and adorn us can make us and the workers who produce them sick. Fashion can no longer be considered a product of pleasure, futile and harmless. The worker in the various steps of production and manufacturing has very little means to defend himself while he is in contact with chemicals in many operations - during the cultivation of the fields, the washing of the fibers, the dyeing or the finishing **(Fig. 1).** Consumers know very little about the toxins hidden in factories or how a product as essential to our lives as clothing came to be potentially dangerous.

Fig. 1. From production to resale: chemicals at every step



Source: A. Millet, 2021

The tendency to view clothing as inert and harmless is partly responsible for the lack of awareness of its potential toxicity. Unlike food additives and ingredients, whose potential dangers are (to some extent) known, clothing is not ingested. Clothing manufacturing now takes place around the world, invisible to Western consumers who know almost nothing about the contents of the factories and the conditions under which they are produced.

Fortunately, we can build on initiatives inspired by the disastrous results of chemical testing in textiles. The establishment of labels over the past 20 years also shows a growing interest from civil society and the European Union. **The Global Organic Textile Standard (GOTS)**, for example, was created in 2002 for organic textiles. It certifies not only dignified working conditions but also respect for the environment and certifies a product that does not affect the health of those who wear it. The Detox campaign of Greenpeace was launched in 2009-2010. The **Zero Discharge of Hazardous Chemicals (ZDHC)** certification was created in response to Greenpeace's work. This list is not exhaustive. Actions have multiplied in response to the dangers of toxic products. The recycling of plastic fibers is particularly problematic. The recurrent use of the term "recycled" often hides a greenwashing operation. Indeed, it is about "decycling" and not "recycling". At the end of life, the transformation of waste into a new product actually devalues the materials that end up being transformed into a product or material of lesser quality. However, the apparel industry is taking too long to react internally. In addition, it continues to play games with suppliers by putting pressure on prices and thus on the quality of the garment. The demand for low-cost items, and therefore potentially made with cheap, low-quality and unsafe products, continues to grow. Buyers have not changed their relationship with suppliers, often located in poor countries with dramatic working conditions. They do not hesitate to put them in competition, to change factories and suppliers, without taking into account the composition of the product. Among these initiatives, the State of California has produced legislation that requires clothing labels to disclose the chemicals they contain and describe their impact on human health, allowing consumers to make informed choices.

California's Proposition 65, also known as the Safe Drinking Water and Toxic Enforcement Act of 1986, is a California state regulation that applies to consumer products. This regulation primarily prohibits:

a. The unrestricted use of toxic chemicals in consumer products without using appropriate warnings.
b. The discharge of listed substances into the drinking water source.

The purpose of California's Proposition 65 is to protect the people of California from harm caused by exposure to certain types of chemicals.

The California Office of Environmental Health Hazard Assessment (OEHHA), which administers California Proposition 65, periodically updates, usually annually, the list of chemicals that can cause the following health problems in humans: cancer, developmental

diseases, female or male reproductive problems. Currently, about 1,000 chemicals have been added to the list and this number is expected to increase in the future.

REACH regulation is a key element of this proposal. It is an essential basis for business and inspires many countries. However, it is very difficult to control the huge volumes of products entering the European Union and the quality of products manufactured by European companies. Five hundred European companies have not complied with the regulation of clothing and textiles (REACH) concerning toxic substances (ECHA 2019). REACH and WHO chemical regulations are incomplete and difficult to enforce in the face of WTO and technical barriers to trade (TBT) challenges (Schinasi 2000). In addition, fashion was largely left off the COP27 agenda, even though the carbon footprint is significant in all major sectors, from fossil fuel extraction to agriculture, and the problems of overconsumption and disposal are very much present. The results are very mixed and the efforts are not fast enough. But **change is possible** (Muthu 2018) and the European Union must continue its leadership. Chemical safety has many scientific and technical components. These include toxicology, ecotoxicology and the chemical risk assessment process, which requires detailed knowledge of exposure and biological effects.

In Europe, several Members of the European Parliament (MEPs) have put the issue of toxic fashion and its importance to the environment, including ecocide and biocide, on the agenda. The researchers consider the notion of ecocide to be central to contemporary society. But if we extend their demonstration and consider the fashion industry's conscious complicity, since the science is public, in poisoning the human body, it is possible to consider the notion of homicide (Sands 2016). REACH is a good basis, but we will show that this legislation fails to control the entry of textiles containing substances hazardous to health into the European Union. We will therefore examine the available scientific data to question the characteristics of the European textile market, and of national markets, its relationship with exporting countries and the possibilities for regulation and collaboration.

This proposal therefore presents the **toxic risks** identified in the supply chain to the consumer **(Part 1)** by first analyzing the chemicals and the health consequences, and then the **steps of detoxification**.

The **implementation of legislation, its obstacles and expectations,** are examined by the complex global legislative puzzle to the information on labels **(Part 2).**

Finally, in the interest of feasibility, we recommend **(Part 3)** a **strong collaboration between the different actors, workers, trade unionists, consumers, NGOs, the WHO and the WTO,**

existing and future trade partners, in order to propose concrete, feasible measures that ensure the safety of the populations.

PART 1

FROM THE SUPPLY CHAIN TO THE CONSUMER: TOXIC RISKS

The textile and apparel industry makes a major contribution to the gross domestic product (GDP) of the economy. In 2019, the EU textile and clothing sector employ over 1.5 million people across 160,000 companies (Briefing, no. 01/2022). According to Euratex, in 2019, the main exporters to the EU-27 were China, Bangladesh, Turkey, the United Kingdom, India, Cambodia and Vietnam. The EU has 80 billion euros worth of textile products from non-EU countries. EU member states. However, according to Euratex, the EU textile and clothing sector exported 61 billion euros in exports **(Fig. 2).**

Fig. 2. Imports of clothes from non-EU countries (2019)

	Countries	**Billion euros**	**% of total**	**Trade preferences**
1	China	23	29%	WTO
2	Bangladesh	15	19%	GSP/Everything But Arms (EBA)
3	Turkey	9	11%	Customs unions since 1995
4	United Kingdom	5	6%	FTA in force since 2021
5	India	4	5%	Standard GSP; ongoing negotiations
6	Cambodia	3	4%	GSP scheme suspended because of serious and systematic violations of the principles of certain human and labour rights convention
7	Vietnam	3	4%	FTA in force since 2020
	Others	18	22%	

Source: European Commission (https://ec.europa.eu/eurostat/web/products-eurostat-news/-/edn-20200424-1 ; https://policy.trade.ec.europa.eu/eu-trade-relationships-country-and-region/negotiations-and-agreements_en)

In 2021, in the details of trade in clothing, the ten largest exporters alone exported $460 billion worth of goods, or nearly 85.6% of the total. China is in the lead, ahead of the European Union (28% of which is outside the EU), Bangladesh, Vietnam and Turkey. In terms of textile imports, the 10 largest customers accounted for 53.1% of global demand, or $206 billion. Here again, the European Union is the main importer, with 20.5% of the quantities imported by the Top 10.

Vietnam (+21%), China (+14%) and above all Bangladesh (64%) follow, the latter having been favored by international political events in Ethiopia, Myanmar and Xinjiang.

The apparel and textile industry has strong supply chains that enable it to respond to global trends and customers. There are many issues, environmental and social, today. But attempts to reshape the industry reveal many structural, operational and performance difficulties, problems of overconsumption and violations of global and European standards.

1. Chemical Products and Health Consequences

Complex supply chain networks sporadically make missteps and miscalculations that have major consequences as they hamper the entire process from raw material selection to the product desired by the customer.

Supply chain management (SCM) has become essential in risk management. Companies are particularly focused on supply risk and cost management. This is not enough. Logistical challenges do not address human health risks. A smarter, more respectful supply chain must consider the toxicity of products. Many of them are identified. Some are banned. Others must be below a defined threshold, notably by REACH. Some products still present dangers and their risks are minimized. Chemicals ensure, in particular, the function of materials and textile products. Some of them present very worrying hazard characteristics. There is a short-term need to eliminate this hazard (Senthil Kumar, Suganya 2017).

Many researchers are working on substitutes. However, there is also a need to ensure their sanitary compliance. The process is slow.

Studies show that between 1 kg and 5 kg of chemicals are used per kg of textiles during the whole manufacturing process. It is estimated over 8000 synthetic chemicals are used in the fashion manufacturing process. Some substances are harmful to health and/or the environment. They have been shown to be sensitive toxic to humans, ecotoxic, persistent or bio-accumulative (Munn 2011; Olsson 2009; Jönsson, Posner, Roos, 2018). All stages of textile manufacturing, from pesticides in the fields, inputs in fiber production, washing, transportation which requires anti-mildew products, dyeing, finishing (anti-static, anti-crease...) and up to the baling of second hand items, are subject to the use of chemicals. The impact of hazardous materials is felt in the early stages of production and manufacturing to the consumer who buys textiles. But it doesn’t stop there, as textile waste has negative consequences on the environment and the people who live near landfills.

Two surveys by the NGO Clean Clothes Campaign also alert to the harms of the industry on workers. Denim, an extremely popular product, has a dramatic impact on the health of workers (Clean Clothes Campaign, 2019 and 2012).

The report, published by the Turkish Clean Clothes Campaign in 2019, focuses on the impacts of potassium permanganate on workers in Turkey. Abdulhalim Demir, a former Turkish garment worker who suffered from lung problems, authored the report. Potassium permanganate replaced denim sanding when it was shown to promote silicosis. It is used in spray form to create the faded look of denim. Workers are affected by skin and respiratory problems, such as bronchitis and pneumonia, as a result of spraying the product in confined workshops without proper protection. This chemical is classified as "hazardous" by the European Chemicals Agency. Animal tests have also shown that repeated exposure to the substance results in possible reproductive or developmental toxicity. Workers can spray the product for up to 72 hours per week. Silicosis, tuberculosis, asthma, chronic obstructive pulmonary disease and interstitial lung disease are also characteristic of the impact of products on workers in the denim industry in Bangladesh.

These products are invisible to the naked eye and are therefore imperceptible to a customer who has the right to know whether or not their purchase is toxic. The dangers of food seem more obvious because the consumer voluntarily ingests the food. But the skin is the largest organ of the human body: 16% of its total weight. It absorbs the products present in clothing. Textile products should therefore be manufactured and transported according to safeguard standards. This is not always the case. One report found that clothing shipped from China and Southeast Asia contained 900 times the recommended level of formaldehyde (Senthil Kumar, Suganya, 2017; cleangredients). Today’s clothing is made with a staggering 8,000 synthetic chemicals. This is the main reason for the interaction between the skin and chemicals, which creates problems such as infertility, respiratory diseases, contact dermatitis, and cancer (Hasanuzzaman Bhar, 2016). Some do not degrade easily (i.e. they are persistent) and others are bioaccumulative. When they do both, they are PB substances under REACH. Only PBT substances are SVHCs (Substances of Very High Concern), which means they must be toxic in addition to being designated as such. These are inherent chemical properties of the substances. Unintended reactions happen. However, 95% of the problem is the substances used. Yes, accumulation makes food toxic. Bioaccumulation and its effects, SVHC, such as carcinogenicity, are urgent problems.

From Skin Rash to Cancer

Numerous studies have shown that the chemicals used in the clothing industry are dangerous for the environment and the human body. Synthetic fibers are not the only ones with problems. For example, cotton is the most pesticide-intensive crop in the world.

As for the dyeing and washing operations, they are the most dangerous, especially because of the azoic and chloric and chlorine, which are extremely toxic, that they require. In the producing countries, the standards on this subject are non-existent. During the washing, the lye of soda allows the textile to keep its flexibility. The worker, who tread with his legs the textile and the lye composed of chlorinated substances, first lose their hair and then have a high chance of developing develop skin cancer. In the last ten years, the number of cancers has doubled in the Indian dyeing regions of India, as Dr. K. Velaman of the Erode Cancer Center in Tamil Nadu. The solvents have been used for 20 years, solvents are responsible for cancers of the esophagus esophagus, kidney, uterus and breast cancer.

The sharp increase in the number of autistic children over the last ten years in India has also raised concerns among researchers. A very serious scientific study examined the levels of toxic metals in 55 autistic children aged five to sixteen years old and 44 controls of the same age and sex, not autistic. It measured the presence of toxic metals in whole blood, red blood cells and urine to determine if there was a correlation between these metals and autism.

The urine contained nickel, lead, barium and aluminum. Cadmium and mercury are the most systematic variables most systematically significant in cases of autism.

The conclusion is quite clear: the majority of children with autism have higher average levels of several toxic metals than others; and these levels are strongly associated with autism severity (Adams, 2012).

Over the past two decades, the number of cancers in the Malwa region of Punjab has exploded. There were 800,000 new cases in 2001; there were 1,220,000 in 2016.

The majority of the population works in various jobs that production requires. The cultivation of cotton - with its doses of pesticides - but also air-drying, fiber processing and processing or bale packing are all opportunities to breathe are all opportunities to breathe in toxic particles. In southern India, 30,000 farmers have filed a lawsuit against the dyers, whom they consider responsible for their sterility: one out of two one in two farmers in the region is sterile. Only 500 plaintiffs have been compensated. This situation echoes the damage that scientists are constantly denouncing, caused by pesticides in California on fertility and pregnant women (Nanda and al., 2016).

Chemical defoliants (Tribufos) sprayed on the seedlings are very dangerous. The environment and human health pay a high price for the use of herbicides. These chemicals remain in clothing even after finishing, which can disrupt the life of the clothing. Moreover, despite being organically harvested, raw cotton is dyed. During the dyeing process, many chemicals are used, some of which may not be of good quality or sufficient purity and may contain toxic substances (desired or as impurities).

Synthetic fibers made from wood pulp are marketed as being more durable. But wood pulp treated with caustic soda and sulfuric acid is harmful, especially to the worker who handles it in poorly ventilated workshops without proper protection. These products are corrosive to the eyes, skin and respiratory tract.

As for synthetic fabrics, they are known for their disastrous consequences on human health.

- The skin, the largest organ, absorbs toxins. They bypass the liver which is responsible for eliminating toxins.
- The petrochemical fibres restrict and suffocate the skin.
- The total toxic load induced in the body to trigger the onset of disease.
- The accumulation of toxic in the body and the interaction between several chemicals create even more serious problems than the individual chemicals.
- The skin rashes, nausea, tiredness, burning, itching, headaches and breathing difficulties are all associated with chemical sensitivity.
- Label claims: anti-static, anti-shrink, sweat-proof and mildew-resistant, chlorine is linked to a 30% increase in lung cancer.
- Flame retardants can cause thyroid problems, brain damage, ADHD symptoms and fertility problems **(Fig. 3).**
- Permethrin insecticide used in military uniforms has not been proven safe.

« Wrinkle-free » label textiles may contain per-fluorinated chemicals (PFCs), used to make Teflon, which are known to cause many health problems. Synthetic synthetic fabrics have the quality of being « water washable ». But in a washing machine, they release a large quantity of synthetic fibers, with harmful consequences for the aquatic environment. Water treatment plants are not capable of filtering these microfibers from the water and they end up in the food. Wrinkle-free polyester fabrics are made from xylene and ethylene. Ethylene oxide is toxic by inhalation to the respiratory and nervous systems and irritating to the respiratory tract, skin and eyes. This substance is found in particular in sterilized textiles and protective clothing. Sportswear, swimwear and thermal underwear are made from spandex and olefin. Olefin is produced by «cracking» petroleum molecules into propylene and ethylene gas (INRS 70).

Deadly chemicals used in textile mills include nonylphenol ethoxylate (NPE), which is known to be an endocrine disruptor. NPE use is limited in Europe and America, but textile mills in China and Southeast Asia use it. Toxins such as formaldehyde, brominated flame retardants and Teflon may still be present as impurities in the final textile. Sleepwear worn to bed can contain carcinogenic flame retardants (Medicaldaily**; Fig. 3**).

Benzidine is still used in methylene chloride, tetrachloroethylene, toluene and pentachlorophenol (Sakthisharmila 2018). As with most organic solvents, benzene causes digestive and neurological disorders, with inhalation pneumonitis if ingested. Benzene is irritating for the skin and induces superficial eye lesions. Repeated exposure can cause neurological and digestive disorders. Toxicity is primarily hematological: thrombocytopenia, leukopenia, bone marrow aplasia, but especially hematological malignancies and lymphopathies. Benzene is a proven carcinogen for humans. Genotoxic effects are observed in case of occupational exposure. Effects on the reproductive function have been reported but the effects on pregnancy are poorly characterized apart from an increased frequency of abortions (INRS 49). VOCs are also present in drinking water. They can therefore penetrate groundwater. In accordance with the U.S. Environmental Protection Agency thresholds, a maximum contaminant level (MCL) has been established for each chemical or additive. Cleaning products (formaldehyde), water repellents (fluoropolymers), flame retardants, bactericidal and fungicidal chemicals (triclosan and nanoparticles) are known to cause skin and lung irritation and contact dermatitis. Other toxins include sulfuric acid, urea resin, sulfonamides, halogens, and sodium hydroxide (Senthil Kumar, Suganya, 2017). As for compliance with thresholds, it is currently uncontrollable given the volumes of textiles traded globally. The customs officers at the borders have neither the means, nor the time, nor the technical tools to control each import. The control must therefore be effective before the arrival of textiles in the European Union.

In any case, there is an urgent need for action to replace hazardous chemicals with safer alternatives in clothing. It is a matter of imposing the strictest legislation on the most permissive country in order to enforce the required sanitary standards. This list is not exhaustive. Moreover, the effects of products in infinitesimal doses should not be minimized over the long term. The cocktail effect, i.e. the effect that a mixture of these different substances can have on health, is not negligible since hundreds of endocrine disruptors are permanently present in the environment.

Typologies

The Swedish Chemicals Agency (Swedish Chemicals Agency 2004a) has grouped chemicals according to:

- their chemical structure (polychlorinated biphenyls, phthalates, etc.),
- functional properties (plasticizers, flame retardants, etc.), or
- toxicological properties (carcinogens, endocrine disruptors, etc.).

Functional properties of chemicals can be divided into several categories:

- Effect chemicals.
- They provide a function to the textile product (softeners, plasticizers, etc.). The buyer and the designer are the decision makers of this effect.
- Treatment chemicals.

They are used during production (anti-foaming agents, catalysts, etc.). It is the textile engineer or the company that decides on the use of specific products.

The grouping, “effect chemicals” and “processing chemicals”, into two sets facilitates the analysis (Jönsson, Posner, Roos, 2018).

Effect Chemicals

Effect chemicals give the item a specific function. Chemicals are therefore considered from the design stage. Flame retardants save lives every year. Clothing can also protect health for certain professions or in the sports sector. The biocides also ensure the safety and reliability of health

care. But products with toxic properties contribute to environmental burden and human health degradations (Swedish Chemicals Agency 2014 ; **Fig. 3**).

However, there is no point if the functional chemistry lasts twice as long as the garment or conversely the color, for example, fades after the first few washes for a product intended to last for several years. Chemicals are also relevant to the end-of-life scenario of a textile product. Chemicals that threaten the vision of nontoxic circular materials or that disrupt a recycling process should be adressed and only used when the function is needed and cannot ba achieved with less toxic processes or chemicals.

Processing Chemicals

Processing chemicals are necessary to operate the processes. However, they do not contribute any desired properties to the final product and therefore are not intended to remain in the product.

Examples of process chemicals include:

- Organic solvents
- Surfactants, such as wetting agents and dispersants.
- Curative agents
- Gas pedals
- Chain extenders
- Lubricants
- Defoamers
- Catalysts
- Hardening agents
- Vulcanizing agent (rubber)
- Retarder (rubber)
- Complexing agent
- Salts
- Acids and bases
- Tanning agents (leather)
- Drying agents
- Intermediates, precursors and monomers.

The following three are expected to remain in the product:

- Softeners
- Reactive resins (e.g., binders and adhesives) for various finition treatments.
- Biocides as preservatives in the process or during storage and transport, e.g. fungicides and preservatives.

Chemical remnants may end up in the product and cause health and/or environmental problems (Jönsson, Posner, Roos, 2018).

2. Steps of Detoxification

Detoxification is the process of getting rid of toxins and other harmful chemicals in consumer products.

The Risk Assessment

Hazard assessment is a segment in which toxicity, dose response and exposure via water and air are determined by a model calculation. Dermal absorption is performed using animal studies. The different concentrations (µg/cm2) versus time (h) are performed considering the skin residues before and or after washing with soap. The average recovery of the total dose through the urine, the deep layer of the skin, and the initial segment of the small intestine (duodenum); the average absorbed dose is analyzed. Then, dose response assessment is experimented with to check for specific sensitivity to infants and children. The selection of toxicity endpoints is a key factor in performing the previous risk assessment. The exposure scenario also assesses inhalation risk. When the level of toxic appears to be too high compared to normal levels, it is recorded as abnormal. The Chinese textile industry is mainly responsible for toxic water pollution. In 2020, China was the world's largest exporter of textiles with an export value of nearly $154 billion. The Ministry of Water Resources (MRW) in China released a report on water quality in China: nearly 80% of groundwater is so polluted that it is hazardous to health. The textile industry is estimated to be responsible for 17-20% of global water pollution, and about 70% of river pollution in China. The manufacturing processes and in particular the dyes discharged by the factories, which are regularly discharged into the water, are responsible. Aquatic fauna and local populations suffer from a lack of resources (Inserm, 2021 ; Huffpost 2015 ; ADEME).

Suppliers there use a wide range of hazardous chemicals in the making, manufacturing and processing of garments. This results in a significant amount of industrial waste, which contaminates the Chinese environment as well as human health. The past has shown that most brands do not even feel responsible for what happens in the manufacturing companies in their supply chain (Coste-Manière et al. 2017). There is an awareness of the disastrous ecological and human consequences of the textile industry (Cornell, Häyhä, Palm 2021; Know the chain 2021). It is still insufficient.

Greenpeace has lobbied to demand phase out 11 groups from their supply-chainsthe elimination of hazardous products from companies like Nike, H&M, Valentino, and Burberry. These companies are signing public pledges for concrete action and greater transparency (Greenpeace, 2012, 2016).

Reports on the dangerous impact of products have multiplied in recent years. In 2019, Green America reports that :

- Approximately 20% of industrial water pollution comes from textile manufacturing.
- Less than 1% of clothing inputs are recycled into new clothing.
- Companies are legally obligated to pay minimum wage to workers abroad – but these wages are not high enough for workers to sustain a living.
- Due to a long and complex supply chain, the fashion industry alone emits 10% of global carbon emissions.
- 43 million tons of chemicals are used in textile production every year.

« The environmental impacts of clothes begins long before fibers are spun into textiles. From polyester textiles, which makes up 55% of textile production, and cotton textiles, which makes up 27% of textile production, the process of making clothes is often a polluting one from the start. In 2015, an estimated 98 billion tons of petroleum was used by the textiles industry to create synthetic textiles, fertilizers for growing crops, and chemicals used to process textiles. The higher the quality of fabric, the more chemically intensive the manufacturing process is. Annually, an estimated 53 million tons of fiber are produced for clothing. »[3].

Many brands' promises of transparency are not being kept. For example, in 2022, of those that responded to Changing Markets Foundation's questions about their synthetic fiber suppliers, 27 of 31 (87%) provided insufficient data about their suppliers. Several companies did not provide any information on suppliers of synthetic products. These include retailers Asda, Sainsbury's, and Tesco; mass retailers Inditex and Uniqlo; online retailer Zalando; sports brand Puma; and luxury companies Burberry and Kering (owner of brands such as Balenciaga, Bottega Veneta, Gucci, and Saint Laurent). Others provide sorted information, such as their recycled polyester supplier. Despite commitments under the Science-Based Targets Initiative (SBTi), the UNFCCC Fashion Industry Charter for Climate Action, the Carbon Disclosure Project, or Textile Exchange, many companies do not map their synthetic supply chains and

[3] https://www.greenamerica.org/sites/default/files/2019-07/GA_TextilesReport_Final_0.pdf

therefore cannot control fundamental sourcing risks, such as the use of oil from conflict-affected countries (especially Russia), coal, and gas from fracking techniques[4].

It is also the responsibility of governments and the European community whose decisions can affect many countries at the same time. Any product containing PCFs should be banned from entering the European community.

Banning PFCs

Scientists use "PFCs" as an abbreviation for two distinct but related sets of chemicals. Whenever you see the abbreviation, make sure you understand how the author/publisher is using it.

"PFCs" can be an abbreviation for either:

- perfluorinated chemicals, or
- a subset of perfluorinated chemicals called perfluorocarbons.

Perfluorinated chemicals is a term that some scientists use to refer to the group of toxic chemicals that includes perfluorooctanoic acid (PFOA) and perfluorooctane sulfonic acid (PFOS) and other per- and polyfluoroalkyl substances (PFASs).

PFCs are particularly relevant to the implementation of the precautionary approach in the EU REACH (Registration, Evaluation, Authorisation and restriction of Chemicals) regulation, where they are potentially considered a group. PFCs are a group of chemicals that and have been identified as persistent, bio-accumulative, and/or toxic and are known for their water and oil repellent properties.

PFASs are also bio-accumulative, meaning that their concentration in organisms can become greater than that of the surrounding environment. PFASs have been detected in soil and water in remote areas, such as the Arctic, and in the blood of young children, adults and other mammals. The increased levels are of great concern because these substances have been linked to adverse health effects, such as delayed onset of puberty, increased cholesterol levels, reduced immunological responses to vaccination, and over-representation of attention-deficit/hyperactivity disorder (ADHD) in children. Two PFASs are currently legally restricted by REACH:

- PFOS with CAS number 1763-23-1 is restricted under the global Stockholm

[4] http://changingmarkets.org/wp-content/uploads/2022/12/EX-SUM-FR-Syntetics-Anonymous-2.0-.pdf

Convention;

- PFOA with CAS number 335-67-1 is restricted in Norway.

Regulation of other PFOS is proposed (Posner et al. 2013; Bergman et al. 2013; Jönsson, Posner, Roos 2017 ; Grover, 2017). Despite the Stockholm Convention on Persistent Organic Pollutants included PFAS in the restricted list of chemicals for effective monitoring and control, these are indiscriminately used and are being permitted in developing countries such as India (Das, Rajiv, 2022).

In particular, they are based on Annexes I and II of the Stockholm International Convention, concerning perfluorooctanoic acid (PFOA), perfluorooctane sulfonic acid (PFOS) and their derivatives, on Persistent Organic Pollutants. Indeed, the signatories of this convention must:

- ban the production, use, import and export of PFOA and its derivatives
- limit the production and use of PFOS and its derivatives

This legislation is currently implemented in the European Union by the EU Regulation 2019/1021 on persistent organic pollutant (POP).

PFOA and PFOS are listed in Annex I of the EU POP Regulation , which implies a ban on their production, placing on the market and use either as such. However, by temporary derogation, the manufacture, placing on the market and use of PFOA, its salts and PFOA-related compounds are allowed for some applications, such as water- and oil-repellent textiles for protective clothing for workers against occupational accidents and diseases caused by hazardous liquids. The national authorities of Denmark, Germany, the Netherlands, Norway, and Sweden submitted on July 15, 2021, their intention to restrict the manufacture, placing on the market, and use of per- and polyfluoroalkyl substances (PFAS). However, one problem remains: the products continue to enter the European Union.

Textile samples of outdoor clothing were analyzed. The results show that PFAS are present in the samples. Concentrations of PFOS and PFOA exceed the standard set by the European Union for PFOS (1 µg/m2) (EU 2006) and the Norwegian government for PFOA (1 µg/m2). Clean Production Action, an environmental agency, assessed chemical hazards in 2014 (Clean Production Action 2014; Jönsson, Posner, Roos 2017). The United States is now tackling PFAS because the Environmental Working Group (EWG) estimates that 200 million Americans are drinking water contaminated by PFAS (Philips, 2023). The polluted sites have been mapped. Such an analysis does not yet exist for the EU or other parts of the world[5]. Regulations have not yet succeeded in eliminating these products from common textile items.

Fig. 3. Summary information on the hazard characterization of the selected halogen-free flame retardants

Risk category	Substances	Comment
No immediate concern	Ammonium polyphosphate (APP) Aluminium diethylphosphinate (Alpi) Aluminium hydroxide (ATH) Melamine polyphosphate (MPP) Dihydrooxaphosphaphenanthrene (DOPO) Zinc stannate (ZS) Zinc hydroxystannate (ZHS)	• Inorganic and organic substances with low acute (eco)toxicity and no bioaccumulation potential • Chemical stability required for application results in limited degradation (persistence) • Stannates: the (neuro-)tox effects found with in vitro cell based systems were not confirmed with animal studies (in vivo, mice studies), probably due to low bioavailability, therefore no immediate concern
Some concern for environment and humans	Resorcinol bisphosphate (RDP) Bisphenol-A bisphosphate (EDC)	• RDP toxicity to aquatic organisms is main concern, may be linked to by-products (TPP). Low and high toxicity are found for same test species, which is may be due to batch differences in the amount of TPP present as by-product • EDC is persistent
Of concern, risk assessment necessary	Triphenyl phosphate (TPP) Nanoclay (Cloisite)	• TPP very toxic to aquatic organisms is main concern, potential endocrine effects • Nanoclay showed strong in vitro neurotoxicity. May be due to the nanoparticle coating, additional studies needed. Information on the leaching behaviour of nanoclays from polymers is also needed

Source: Jönsson and al., 2018.

[5] https://www.ewg.org/interactive-maps/pfas_contamination/

Color or toxic aesthetics: mordanting process

The color is often the key to a garment. It is an aesthetic indicator but also of quality and seems to be a determining factor in the purchase. Dyes are no longer mostly natural. Many synthetic dyes have been banned for their toxic and harmful effects. While the European regulation REACH came into force in 2007, the textile industry must continue its efforts to adapt to the constraints imposed by this regulation. As a result, in November 2020, the presence of certain substances said to be carcinogenic, mutagenic or toxic to reproduction became prohibited in textiles in contact with the skin. Currently, a dozen families of hazardous substances are subject to restrictions (Fig. 4). As early as the 1960s and 1970s, when their carcinogenic nature was discovered, azo dyes were banned in the industry on European territory. It was decided to replace them with other coloring materials such as anthraquinone dyes and phthalocyanines. A risk of presence of these azo dyes still exists in Europe, because their synthesis has fallen into the public domain, and they continue to be used by some Asian countries like China and India. Although imports are prohibited, the borders are not completely watertight (Louis 2022). The main problem with synthetic dyes is the metallic salts. They are known to cause serious human health problems (Shahid-ul-Islam, Butola, 2018).

Fig. 4. The list of common chemicals and its application

S. No.	Name	Chemical formula	Application	Regulated under REACH
1	Potassium permanganate	$KMnO_4$	Helps for color out from garment	X
2	Caustic soda	NaOH	For bleaching without changing colour of the garments	X
3	Soda ash	Na_2CO_3	Act as washing soda and softening water It creates alkaline medium for the breakdown of pigment dye	X
4	Acetic acid	CH_3COOH	To neutralize the garment from alkaline condition	X
5	Sodium metabisulphate	$Na_2S_2O_5$	Act as a reducing agent	X
6	Pumice stone	–	Act as an abradant in washing cycle	
7	Enzymes: Textile enzyme N1000 Neutral cellulose Bio polish enzyme Cellulose enzyme	–	Develop "Bio-polishing" effect, "Anti-pilling" properties, increases the color fastness and rubbing fastness properties	X
8	Bleaching powder	$Ca(ClO)_2$	Helps white clothes to retain their original color time and again	X
9	Hydrogen peroxide	H_2O_2	Antibacterial and antiviral properties and kills mold, mildew	X
10	Silicon softener	–	Reduce static cling, soften laundry and makes ironing easier	X
11	Anti staining agent	–	Desizing and washing in denim rinsing.	X
12	Sodium carbonate	$NaHCO_3$	Act as anti-pollution agents	
13	Cationic/nonionic flax softener Ethers, polyglycol esters and oxiethylates	–	Creating softer handle over the garments, enhancing performance of the surfactant used in the bleach bath	
14	Salt: Rock salt	–	To remove impurities from the Garment fabric surfaces, act as an electrolyte for migration, adsorption and fixation of the dyestuff to the cellulose material	X
15	Buffer: Monosodium phosphate	NaH_2PO_4	For bleaching and dyeing fabrics	X
16	Stabilizer: Sodium silicate	Na_2O_3Si	Act as a fixing agent, enhancing performance of the surfactant used in the bleach bath	X
17	Optical brightener: Resin	–	Improve the brightness of garments	X

Source : Senthil Kumar, Suganya, 2017

The use of natural dyes should be encouraged by seeking, however, new inputs that are stable, sustainable and promote recycling depending on the type of fiber.

Large quantities of chemicals are used in various textile industries as surfactants, lubricants, cleaning agents, defoamers and some special chemicals at all stages of production from the field to the finishing touches. These chemicals are hazardous to the environment as well as to humans due to their toxic, carcinogenic and mutagenic properties. Thus, offensive chemicals are needed for wet processing instead of these chemicals. The majority of textile industries often use carcinogenic and toxic chemicals, even though this poses health and safety concerns for consumers and workers in the dyeing industries. It is therefore essential to reduce, through substitution, the use of chemicals that produce adverse effects and harmful waste. In addition, chemicals must be able to be reused, recycled for processing when no useful chemical substitutes can be obtained for toxic chemicals (Senthil Kumar, Gunasundari, 2018).

Cases Studies: How are global brands doing?

Professor Tarun Grover (UC San Diego, Department of Physics) analyzed several brands' commitment to eliminating toxics. Among the criteria for analysis, he considered Greenpeace's Detox 2020 plan, which called for brands to drastically reduce chemicals by January 1, 2020. The plan focuses on a company's chemical management system. In particular, he focused on the Manufacturing Restricted Substances List (MRSL), which is necessary to identify hazards and prioritize elimination. The elimination of PFCs has served as a guide for implementation of the 2020 goal. Grover also assesses companies' efforts to eliminate the most hazardous products, such as per or poly fluorinated chemicals (PFCs). He has been responsible for publishing case studies showing how substances have been phased out. The transparency of the company is also taken into account. For example, it can publish a list of its suppliers (Grover 2017). For Greenpeace and Grover, the transparency effort does not provide information on whether suppliers' factories, especially in countries like Myanmar or Bangladesh, use safe products. Yet, a transparent list of products would not even justify the use of products like phthalates or chromium 6. Transparency does not prove improvements in the manufacturing process.

Grover's study examines the chemical use (Fig.5) of four companies, European, Californian and Chinese, that are emblematic of their country of production. They all show flaws in chemical use, either because steps are not taken or because they use flawed protocols from a flawed ZDHC chemical list. In all cases, proactive product stewardship has not occurred. Progress is too limited, too slow and does not concern the majority of companies. The impact of products on workers and consumers endangers their health and requires binding measures.

Fig. 5. Grover's analysis

Companies	Hazardous chemicals	Committed detoxification	Proactive management of chemicals (excluding PFCs)
Adidas	X	X	
Limited Brands	X		
Li-Ning	X		
Nike	X		

Breast milk poisoning at the cemetery

The benefits of breast milk are multiple in terms of prevention of infectious pathologies, certain metabolic pathologies and certain cancers, as well as in the neurocognitive development of the future child and even the future adult.

A class of widely used industrial chemicals linked to cancer and interference with immune function - fluorinated alkyl substances, or PFAS - accumulate in infants by 20 to 30 percent for each month of breastfeeding, according to a new study co-authored by experts at Harvard University's T.H. Chan School of Public Health. PFAS are transferred to babies through breast milk.

« Our serial blood tests now show accumulation in infants the longer they are breastfed « said Philippe Grandjean, assistant professor of environmental health at Harvard Chan School.

Fig. 6. List of PFASs analyzed in textile samples

Compound	Abbreviation	CAS. nr.	Formula
Perfluorobutanoic acid	*PFBA*	375-22-4	C_3F_7COOH
Perfluoropentanoic acid	*PFPeA*	2706-90-3	C_4F_9COOH
Perfluorohexanoic acid	*PFHxA*	307-24-4	$C_5F_{11}COOH$
Perfluoroheptanoic acid	*PFHpA*	375-85-9	$C_6F_{13}COOH$
Perfluorooctanoic acid	*PFOA*	335-67-1	$C_7F_{15}COOH$
Perfluorononanoic acid	*PFNA*	375-95-1	$C_8F_{17}COOH$
Perfluorodecanoic acid	*PFDA*	335-76-2	$C_9F_{19}COOH$
Perfluoroundecanoic acid	*PFUnDA*	2058-94-8	$C_{10}F_{21}COOH$
Perfluorododecanoic acid	PFDoDA	307-55-1	$C_{11}F_{23}COOH$
Perfluorotridecanoic acid	PFTrDA	72629-94-8	$C_{12}F_{25}COOH$
Perfluorotetradecanoic acid	PFTeDA	376-06-7	$C_{13}F_{27}COOH$
Perfluorobutane sulfonate anion	PFBS	45187-15-3	$C_4F_9SO_3^-$
Perfluorohexane sulfonate anion	PFHxS	108427-53-8	$C_6F_{13}SO_3^-$
Perfluoroheptane sulfonate anion	PFHpS	375-92-8	$C_7F_{15}SO_3^-$
Perfluorooctane sulfonate anion	PFOS	45298-90-6	$C_8F_{17}SO_3^-$
Perfluorooctane sulfonamide	FOSA	754-91-6	$C_8F_{17}SO_2NH_2$
6:2 Fluorotelomer sulfonate anion	6:2 FTSA	425670-75-3	$C_6F_{13}CH_2CH_2SO_3^-$

Source: https://www.greenpeace.org/international/press-release/56979/taking-the-shine-off-shein-hazardous-chemicals-in-shein-products-break-eu-regulations-new-report-finds/

PFASs are used to make products resistant to water, grease and stains. They have been used for more than 60 years in products such as stain-resistant textiles, waterproof clothing and some packaging. These compounds - which tend to bioaccumulate in food chains and can persist for long periods of time in the body - are routinely found in the blood of animals and humans around the world and have been linked to reproductive toxicity, endocrine disruption and immune system dysfunction.

The researchers followed 81 children born in the Faroe Islands between 1997 and 2000, examining levels of five types of PFAS in their blood at birth and at 11 months, 18 months and 5 years of age. They also examined PFAS levels in the children's mothers at week 32 of pregnancy. They found that in exclusively breastfed children, PFAS levels in the blood increased by about 20-30% per month, with smaller increases in partially breastfed children. In

some cases, by the end of breastfeeding, the children's serum PFAS concentration levels exceeded those of their mothers.

After breastfeeding was stopped, concentrations of all five types of PFAS decreased. The results suggest that breast milk is a major source of PFAS exposure during infancy (Mogensen and al., 2015)

Current research, due to lack of resources, cannot indicate how long the toxic products remain in the clothing. However, these products seem to remain after death (Varlet and al., 2014). Indeed, cemeteries are no longer empty because of toxic products and plastic.

In addition, clothing dumps in Chile or Ghana demonstrate the toxicity of the clothes when they were worn[6]. Chemicals still pollute the water table. This observation shows that the human body is subject to toxic interactions with their clothes as they continue to act on the environment after being worn and discarded.

Contaminated second hand clothing

Toxicity also remains in the category of "second hand" or "second hand clothing". First, second hand no longer means vintage. Many garments are resold even though they are very recent, as resale platforms show. Also, the trajectory of second hand products requires new products to clean the clothes and protect them from mold. They can also be very toxic. Toxics found in used clothing bundles include formaldehyde, phthalates and polyvinyl chloride. They can cause skin irritations, headaches and respiratory problems. Polyvinyl chloride may contain carcinogens. These products are intended to protect fabrics from bacteria, mold and discoloration, but can be very dangerous for the workers handling them and for the consumer.

Consequently, we believe that it is necessary to intervene with regulations from the manufacture of a garment in order to protect the workers, the most precarious, mostly women, often children, who suffer the use of toxic products in clothing during production and manufacturing. The workers who live near polluted fields and water tables, and those who suffer from the dangerous environment of the places of extraction of raw materials must also be protected. Consumers

[6] Chile: https://www.courrierinternational.com/article/video-au-chili-un-cimetiere-de-vetements-en-plein-desert-datacama Ghana: https://fashionunited.fr/actualite/business/le-ghana-en-a-assez-d-etre-la-poubelle-textile-du-monde/2022112630897

must also be protected, especially those on low budgets who cannot afford to choose the origin of their clothes.

Fig. 7. Hazard assessment for selected water repellent agent related substances that reach the environment via diffuse emissions.

Substance	Hazard classification per endpoint											
	Human health								Ecotox		Fate	
	C	M	R	D	E	AT	ST	N	AA	CA	P	B
Benchmark												
PFOA	H	L	*H*	H	PEA	M	H	DG	L	*L*	vH	H
PFAS												
PFHxA	*L*	*L*	*M*	*M*	PEA	L	*M*	DG	*L*	*H*	vH	*L*
PFBS	DG	*L*	*L*	*L*	PEA	L	*L*	DG	*L*	*L*	vH	*L*
Silicones												
Short-chain silanols	DG	DG	DG	DG	DG	DG	DG	DG	DG	DG	DG	DG
DMSD	DG	DG	DG	DG	DG	DG	*M*	DG	DG	DG	*vH*	*L*
TMS	DG	*L*	DG	DG	DG	*M*	*M*	DG	L	DG	DG	*L*
D4	*L*	*L*	*L*	*L*	DG	L	vH	DG	*L*	vH	vH	*vH*
D5	*L*	L	*L*	*L*	DG	*H*	*H*	DG	*L*	*L*	vH	*vH*
Hydrocarbons												
Paraffin Wax	L	L	*L*	*L*	DG	L	DG	DG	L	L	vL	L
Nanotechnologies												
Dendrimers	DG	DG	DG	DG	DG	DG	DG	DG	DG	DG	DG	DG
Inorg. nanoparticles	DG	DG	DG	DG	DG	DG	DG	DG	DG	DG	DG	DG

Notes. Hazard classification abbreviations: vL = very low, L = low, M = moderate, H = high, vH = very high, PEA = potentially endocrine active, DG = data gap.
Classifications in italics are of low confidence and in bold of high confidence. Classifications based on estimated data are marked with an asterisk (*).
The endpoints are in order: Carcinogenicity (C), Mutagenicity and Genotoxicity (M), Reproductive Toxicity (R), Developmental Toxicity (incl. Developmental Neurotoxicity) (D), Endocrine Activity (E), Acute Mammalian Toxicity (AT), Systemic Toxicity and Organ Effects (incl. Immunotoxicity) (ST), Neurotoxicity (N), Acute Aquatic Toxicity (AA), Chronic Aquatic Toxicity (CA), Persistence (P) and Bioaccumulation (B)

Source: Jönsson and al., 2018.

PART 2

IMPLEMENTATION OF A LEGISLATION

Since the 19th century, mass production and mechanization have allowed the production of objects at lower cost. The rise of the chemical industry has allowed this dynamic to continue. Many industries, oil, chemical and agricultural, are involved in the manufacture of clothing and textiles and blur the transparency of the supply chain. The costs of clothing have become extremely low and call into question their quality and the health risks involved.

1. Liberalization of Textile Trade: mental map and legislation

Countries like China, India, Indonesia, Malaysia, Thailand are adding production flexibility to the elegance of their goods[7]. Indeed, manufacturers compete in ingenuity to diversify the offer, multiplying the trends to seduce consumers. They offer products at much lower prices. Until the lifting of quotas in 2005 when the Agreement on Textiles and Clothing expired, these countries responded to import limits by shifting to other less developed countries. The dispersion of the production apparatus makes traceability impossible without the implementation of an efficient tracking system from the production of the fiber.

Toxicological analyses of textiles show that so-called European brands but manufacturing in China and South East Asia, Chinese brands and clothes manufactured in Chinese or Bangladeshi factories and then resold on "catalog" to brands, do not respect the conditions required within the European Union. The typology of cases is very varied. The volumes of imports into Europe do not allow for the verification of all garments and customs officers do not have the means to systematically inspect. Moreover, verification would require a systematic toxicological analysis since the harmful product cannot be spotted at first sight. The recurrent problems are currently located in China and South East Asia, India, Bangladesh, Pakistan, Thailand, Indonesia, Vietnam, Laos, Cambodia, Myanmar, Srilanka and Singapore.

In order to compete in the global trade competition, these countries have first of all invested in the organization of factories and called upon the labor force. Regulations were not a priority for their economic take-off. These production centers supply the majority of imports into the European Union.

[7] https://worldpopulationreview.com/country-rankings/newly-industrialized-countries

Inspection failures and non-compliance with standards threaten the health of workers in exporting countries and consumers in importing countries. The WTO is a positive force but lacks measures to rationalize and restructure production to protect human health and the environment. As health disasters have already begun, it seems necessary to request safe textile production and imports.

A Global and Growing Concern

At the 2002 Earth Summit in Johannesburg, world leaders met to discuss sustainable development. The harmful effects of chemicals were one of the main challenges to sustainability. The participating countries agreed on the goal that by 2020, chemicals should be produced and used in ways that minimize negative impacts on the environment and human health. The International Conference on Chemicals Management (ICCM) held in Dubai clarifies the goals in 2006. A Strategic Approach to International Chemicals Management (SAICM) was adopted. This policy framework for sound chemical management has since affected chemical management in several sectors, including textiles and fashion (Jönsson, Posner, Roos, 2018; United Nations, 2002, 23).

The ICCM has been held every three years since 2006 and conducts periodic reviews of SAICM. The ICCM provides a platform to call for appropriate action on emerging policy issues (EPI) as they arise and to forge consensus on priorities for cooperative action. So far, resolutions have been adopted in particular on the "Chemicals in products", the "Endocrine-disrupting chemicals", the "Perfluorinated chemicals" and the "Highly Hazardous Pesticides". The resource platform that SAICM offers is a concrete incentive to consider chemical exposure.

In 2012, the Rio de Janeiro Summit, organized by the United Nations took stock of the progress made since the Rio de Janeiro Summit in 1992. It announced the new Millennium Development Goals: sustainable development. The United Nations General Assembly approved this agenda aiming at economic, social and environmental sustainability. The agenda includes 17 goals. Goal 12, titled «Responsible consumption and production. Ensure sustainable consumption and production patterns » which concerns textiles, has still not been achieved by 2022. SDG 12 calls for a profound transformation of businesses towards sustainable consumption and production patterns. It implies a transformation of the entire value chain at both global and local levels. Target 12.8 identifies the right to information. Everyone must «have the information and awareness necessary for sustainable development and lifestyles in harmony with nature». To achieve such a result, traceability is an essential step. This will allow the consumer to make an

informed decision. According to the International Organization for Standardization (ISO), traceability is «the ability to identify and trace the history, distribution, location and application of products, parts, materials and services». Once this information is tracked and available to companies, transparency will allow all stakeholders to have access to relevant information. Both transparency and traceability promote visibility along textile and apparel value chains and thus help build trust among stakeholders (Papú Carrone, 2020). Only the brands, buyers and importers can act on this.

The UNECE (United Nations Economic Commission for Europe) on traceability standards for sustainable garment and footwear explains: "Improving transparency and traceability has become a priority for the garment and footwear industry to increase its ability to manage the value chains more effectively, identify and address labor and human rights violations and environmental impacts, combat counterfeits, and handle reputational risks, while embracing more sustainable production and consumption patterns. In fact, many companies have a limited view of the network of business partners within their value chain and do not get the full story behind their products. Most can identify and track their immediate suppliers, but information is often lost about the suppliers of their suppliers. It requires the collaboration of all industry partners, the deployment of common approaches and reliable technical solutions in widely different environments".

The 2015 review of the planetary boundaries by the Stockholm Resilience Center found that four of the limits have been exceeded: climate change, loss of biosphere integrity, land system change, and alteration of biogeochemical cycles (phosphorus and nitrogen). In 2022, they concluded that the boundary pertaining to chemical pollution had been crossed[8]. The European Environment Agency (EEA) also points to the circularity effort that is becoming necessary given the biophysical limits of the planet[9]. The EEA notes that policies are encouraging the establishment of textile repair and reuse systems to prevent waste in the first place. Waste management involves addressing hazardous materials in textiles to stimulate systemic change within the entire textile system towards a circular economy, fueled by sustainable and safe materials and products.

[8] https://bonpote.com/en/the-5th-planetary-boundary-has-been-officially-crossed-and-nobody-cares/#:~:text=On%2018th%20January%202022%2C%20a,the%209%20identified%20planetary%20boundaries.

[9] https://www.eea.europa.eu/publications/circular-economy-in-europe-insights/circular-economy-in-europe-insights/viewfile

REACH

The European legislation on chemicals REACH comes into effect in 2007. It aims to harmonize legislation on chemicals in the European Union and the countries of the European Economic Area (EEA) (Norway, Iceland, and Liechtenstein). It is also intended to regulate chemicals in many product groups where they were not previously regulated in the EU. REACH is influencing other countries, outside the EU. Regulations are being introduced in China, South Korea, and India. However, the thresholds of toxic products allowed are much higher than those defined for the European Union. This is also the case for products used in the food manufacturing process.

The proliferation of legislation is a real challenge, as some may be loopholes to the REACH Regulation.. REACH can control the chemical content of products manufactured, imported or used in the EU, but textile products and semi-finished goods are constantly exported and imported across national borders. The REACH legislation has an effect on the voluntary nature of companies. Nevertheless, it is not able to control textile products considered toxic imported into Europe (Jönsson, Posner, Roos, 2018; European Commission, 2006; China Ministry of Environmental Protection, 2010[10]; Government of India, 2012; South Korean Ministry of the Environment, 2011[11]). For example, the Governement of India welcomed REACH.[12] India did not have a restrictive list of chemicals. It therefore had to convince manufacturers, especially of agricultural inputs, to participate in the establishment of an Indian REACH. The work has been slow because manufacturers were afraid to be less competitive.

A recent study by Greenpeace Germany has highlighted the toxicity of clothes easily accessible through the internet.

Greenpeace Germany denounces in a study published in November 2022 the methods of Shein, the Chinese site selling clothing at very low cost. The NGO bought 42 items - clothes and shoes - on Shein's websites in Austria, Germany, Italy, Spain and Switzerland, and 5 other items in a temporary Shein store in Munich. The products were analyzed by an independent laboratory. Fifteen percent of the products contained hazardous chemicals at levels above the regulatory

[10] https://www.cirs-reach.com/China_Chemical_Regulation/The_Provisions_on_Environmental_Administration_of_New_Chemical_Substances_2010.html

[11] Korea, revised in 2021 : https://www.cirs-group.com/en/chemicals/revised-k-reach-the-act-on-the-registration-and-evaluation-of-chemicals

[12] https://www.indiawaterportal.org/articles/draft-national-chemical-policy-2012-proposed-ministry-chemicals-fertilizers

limits set by REACH. Five items even exceeded the limits by 10,000% or more. For example, more than 100,000 mg/kg of phthalates were found in five shoes, while the European REACH regulation requires less than 1,000 mg/kg. The record was set in a pair of black snow boots purchased in Switzerland: the level of Di(2-ethylhexyl) phthalate (DEHP) reached 685,000 mg/kg, which is 58,500% above the regulatory level. These two studies show that REACH is not infallible.

One of Germany's largest environmental charities, BUND, has revealed that some chemicals, companies and industries have broken the law by using millions of tons of chemicals without conducting significant safety checks, according to an analysis of government records. Some of the concerned substances may be found in the production of textiles. It used freedom of information rules to obtain details of a German government investigation into chemical safety files from 2014 which concluded that 940 substances did not meet REACH data safety standards. Transparency barriers blocked BUND from verifying whether most of the chemicals remain non-compliant today. But 41 substance dossiers were unchanged from 2014 to 13 April 2019, the date BUND concluded its analysis. Therefore, 654 separate companies are identified in the 41 dossiers and, according to the German investigation, are breaking the law. Germany has most company infringements identified, 169, while the United Kingdom has 80, The Netherlands 68, France 56, Italy 49, Spain 42 and Belgium 38. Firms across all EU member states are found, except Malta and Latvia.

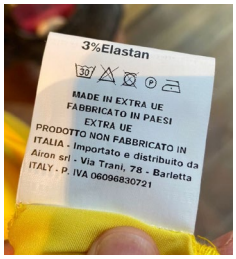
As lessons to be drawn from this case, it appears that while the REACH registration rule (REACH Title II) obliges companies marketing substances to complete safety tests. We face in practice transparency issues. On top of that, ECHA refuses to clearly identify non-compliant substance dossiers or firms, despite multiple requests by NGOs and parliamentarians. Tens of thousands of downstream manufacturers are using chemicals with unproven safety. Workers might be at risk (ECHA 2019).

In March 2018, BfR finally identified for BUND the 940 chemicals that it had “assessed as non-compliant”, but refused to name any of the nearly 7,000 companies involved, citing commercial confidentiality. Though the lead registrant registers safety data, all firms that are part of a dossier are responsible for non-compliance. National authorities should increase transparency and impose tougher sanctions, including fines, name and shame or criminal proceedings without delay,

2. The Label: Information for All

The labeling is currently poor. Consumers do not understand what a fibre is. They do not differentiate between natural and artificial fibres, for example. A standard label seems necessary. It will be readable, even for a neophyte. Also, detailed information on various environmental aspects such as energy use, water consumption, carbon footprint, ecological footprint and so on should be available for various fibres and different textile products, encompassing the complete life cycle phases of textile products.

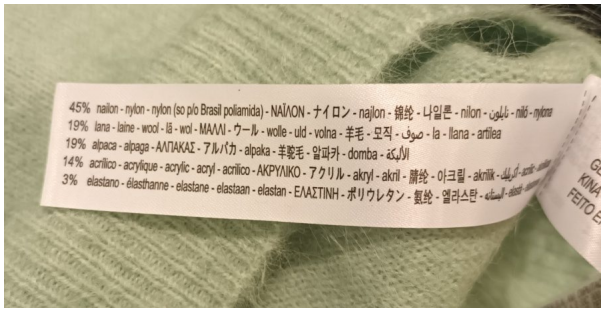
Fig. 8. Heterogeneity of labels in Europe (Palermo, Prato, Paris, Vienna)



The label does not indicate 97% of the fibers, the place of manufacture or the care instructions.

There is no indication of location, nor for the maintenance of the garment.

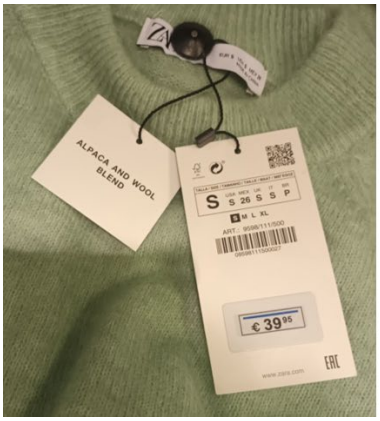
The label indicates a manufacturing address in Prato to emphasize the quality of "Made in Italy".

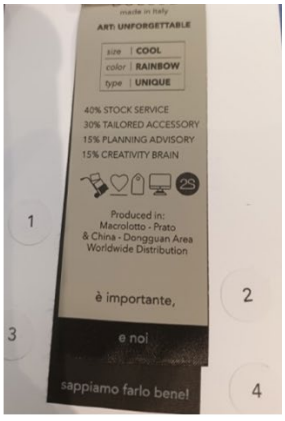


The label is illegible. It is written in a too small font and a bold font could emphasize the important points.

Below, the brand name "Nina Kendosa Parigi" can be misleading for the consumer. He may believe that it is a product "Made in Paris" when it is actually made in Italy. Brands use loopholes in regulations to increase their sales and develop deceptive marketing strategies.

The strategy of fraud also concerns the materials. On this sweater, the first visible label praises the quality of the wool and its luxurious character. But the label inside indicates 62% synthetic fibers (nylon, acrylic, elastane). There are no indications on the products used.





The marketing label system is particularly misleading. It is very easy for a company to get labels. Factories are entirely dedicated to this marketing strategy. The pictures above are from one of them. The choice is exponential.

It is also possible to order marketing images to give an extra touch to the product. No verification is made on the final product. At the point of sale, the prices can hide the composition of the product.

These informations call into question the ability of national enforcement authorities to control products and a problem with the application of the Unfair Commercial Practices Directive (art.6)[13].

Finally, warnings concerning toxic products should be indicated, as in the State of California **(Fig. 9).**

Fig. 9. Fashion nova swimsuit made in California and labelled according to California law, 2019

The new law comes into effect in January 2025 and prohibits the manufacture, sale or distribution of new textiles and apparel products containing perfluoroalkyl and polyfluoroalkyl substances, or PFAS, a group of chemicals commonly used to make garments

[13] https://eur-lex.europa.eu/legal-content/EN/TXT/?qid=1585324585932&uri=CELEX%3A02005L0029-20220528

waterproof or stain-resistant[14]. It extends the 1986 law. Apparel makers will be required to use “the least toxic alternative,” and procure a certificate of compliance from manufacturers (toxicfreefuture, 2022).

Another issue, rather technological, is the durability of labels linked to specific products. To guarantee traceability, the labels must be robust and resist until the recycling phase.

[14] https://toxicfreefuture.org/press-room/washington-governor-signs-bill-aimed-at-phasing-out-pfas-forever-chemicals-by-2025-the-fastest-pfas-timeline-in-the-nation/

PART 3

RECOMMENDATIONS

I. EU Measures

I.A Trade arrangements

I.A.1. Many producing countries are eligible to the **Generalized Preferences Schemes**. The apparel/clothing and footwear sectors are the first - and by far - sectors benefiting from the GSP (59% of the total, see figure 2), more sustainable practices in producing countries would reverberate on the impacts of the GSP covering 2 billion people around the world. The topic is particularly acute in terms of women empowerment and gender equality since nearly 80 percent of the world's garment workers are women and, consequently, in terms of child labour. The use of chemicals in textile could become a point of attention in countries benefitting from the GSP+ scheme in case the new regime due to apply from 1 January 2024 included in its Annex VI the ILO Conventions on Occupational Safety and Health as suggested by the European Parliament.[15]

I.A.2. When it comes to countries (like India or Indonesia) with which a fully-fledged **free trade agreement** is envisioned and insofar this country is a top producer, the Trade and Sustainable Development chapter could foresee explicit provisions in the spirit of those related to circular economy in the EU-NZ FTA (these provisions does not target specific sectors)[16]. Besides the usual mention of the Responsible Business Conduct and Supply Chain Management provisions, it could draw inspiration from the **OECD Due Diligence Guidance for Responsible Supply Chains in the Garment and Footwear Sector**[17]. The rulebook states general rules and provides enterprises with information on how to tailor their due diligence approach when addressing specific sector risks. The Guidance enumerates 12 particular risks, including hazardous chemicals, occupational health and safety which relates to hazardous

[15] Cf. Amendment 117, https://www.europarl.europa.eu/doceo/document/A-9-2022-0147_EN.html#_section1
[16] https://circabc.europa.eu/ui/group/09242a36-a438-40fd-a7af-fe32e36cbd0e/library/5b1523f5-4758-4ce5-892a-9c4828063d69/details
[17] https://www.oecd-ilibrary.org/docserver/9789264290587-en.pdf?expires=1666170007&id=id&accname=ocid194994&checksum=05E27BA2EB92F43DEA21132FECE2D3FE

chemicals, trade unions and collective bargaining, water, child labour, forced labour, bribery and corruption, etc. When it comes to hazardous chemicals, the enterprise should inter alia:

- "scope the chemicals commonly used in the production of goods within its sub-sector, with an emphasis on identifying harmful and hazardous chemicals and restricted chemicals" and "establish an inventory of chemicals being used in the production and manufacturing of the enterprise's products (taking a risk based approach)";

- "identify higher-risk countries for the use of hazardous chemicals, which include those that do not adequately regulate the use of chemicals or enforce existing regulations" (this recommendation relates to the proposed thematic and geographical expansion of the scope of the Bangladesh Accord, see below);

- "work towards identifying suppliers operating in higher-risk countries at higher-risk stages (e.g. textile production and tanneries) of the supply chain for harmful and hazardous chemicals";

- "support the development of and adopt a common industry-wide Manufacturing Restricted Substances List (MRSL) for the sector based on a credible scientifically-based assessment of hazards. Provide adequate training to management and workers on chemical use, storage, etc. The enterprise may choose to implement innovative business models (e.g. chemical leasing) where appropriate to reduce the use of harmful chemicals".

The module on hazardous chemicals concludes with a list of close to 20 relevant international instruments, standards and tools.

I.A.3. On top of that, the EU should assume its responsibilities as top importer and global leader for the delivery of Sustainable Development Goals and help poorer countries to uphold more ambitious standards and practices regarding the sustainable use of chemicals in the textile sector. It has to ramp up **technical and financial assistance** to the producing countries by means of its Neighbourhood, Development and International Cooperation Instrument (NDICI)[18] – Global Europe and its Aid for Trade scheme.

[18] https://eur-lex.europa.eu/legal-content/EN/TXT/PDF/?uri=CELEX:32021R0947&from=EN

I.A.4. The issue of hazardous substances in textiles is a global one where cooperation between the US and Europe would be mutually beneficial and serve broader purposes (like the SDGs). Drawing inspiration from REACH, the United States finally opposed PFAs. Europe can also learn from the Californian law. Moreover, the US and Europe import massively Chinese or South East Asian textiles and face similar problems. Therefore, the Trade and Tech Council established as a collaborative body between the US and the EU, could put on its agenda the consequences of the global textile sector on working conditions and consumers health. The "technology standards cooperation" or "global trade challenge" working groups, for example, could host such exchanges[19].

I.A.5. Considering the high degree of internationalization of the sector, the toxicity of substances that may enter the production phase and the weak level of information given to consumers, the OECD guidelines and the EU regulations such as REACH may vindicate an **EU mirror clause.** By applying mirror clauses the EU intends to insert reciprocity of standards so that trade partners ensure that their operators respect environmental and sustainability standards equivalent to those set in the EU. So far, the debate about mirror clauses has mostly focused on agrofood standards, Upon request of the Council, the Commission produced a report on the feasibility[20]. In short, it stated that to be WTO compliant, the measure should pursue one or more of the policy objectives listed in Article XX of GATT, satisfy a "necessity test" (proportionality), and not entail arbitrary or unjustifiable discrimination in the design, structure and application so as to be a disguised restriction on international trade. "Concerns that have a global dimension and are internationally recognised by at least part of the international community (e.g. climate change, biodiversity loss, AMR) are more likely to be accepted as legitimate reasons for action."

I.A.6. The forthcoming **revision of the Union Customs Code** will "strengthen the legal framework for customs and make it suitable to address the challenges that have emerged in recent years. New business models and technological developments require revised rules, in

[19] https://trade.ec.europa.eu/doclib/docs/2021/june/tradoc_159642.pdf
[20] https://food.ec.europa.eu/system/files/2022-06/ia_environmental-standards-aw-report.pdf

particular on (...) protection of the single market from goods imported from non-EU countries that are not compliant with EU legislation."[21] Therefore, it is a good opportunity to put the emphasis on goods that may be subject to a mirror clause or to a particular attention like textiles.[22]

I.B Domestic measures with a trade dimension

I.B.1. In the context of the proposal for a **corporate sustainable due diligence directive**, the textile sector has been singled out by the European Commission as a sector showing a high risk of human rights and environmental adverse impacts which necessitates to broaden the coverage of their companies. The annex displaying the list of violations of rights and prohibitions included in international human rights agreements should be completed to take into account that since the release of the proposal, "At its 110th Session in June 2022, the International Labour Conference decided to amend paragraph 2 of the ILO Declaration on Fundamental Principles and Rights at Work (1998) to include "a safe and healthy working environment" as a fundamental principle and right at work."[23] This is important since as substantiated above, chemicals may pose a significant health risk to consumers but first and foremost, to workers in production unit who are often deprived of basic protection equipment and of relevant information regarding the toxicity of the products they manipulate.

I.B.2. With its 2023 Work Programme (CWP)[24], the European Commission is opening a window of opportunity to improve the way chemicals, especially in the textile sector, are addressed. The long overdue revision of **REACH** spelled by an impact assessment is announced for the end of 2023 (while initially scheduled for March 2022) with a view of duly reflecting and supporting the political ambition of the European Green Deal all the while avoiding uneven competition by strengthening enforcement and compliance. Complementary to that, an initiative will aim at reviewing EU rules governing the use of chemical data and increasing

[21] https://ec.europa.eu/info/law/better-regulation/have-your-say/initiatives/13316-Revision-of-the-Union-Customs-Code_en

[22] Proposals I.A.4 and I.A.5 are domestic measures in the sense that they depend on the political will of the EU institutions makers and only them but since they aim first and foremost at having a trade impact, they were arbitrarily place under the "trade arrangements" section.

[23] https://www.ilo.org/global/topics/safety-and-health-at-work/areasofwork/fundamental-principle/lang--en/index.htm#:~:text=At%20its%20110th%20Session%20in,consequential%20amendments%20to%20the%20ILO

[24] https://ec.europa.eu/info/sites/default/files/com_2022_548_1_annexe_en.pdf

transparency. The CWP says that “it will enable EU and national authorities, where necessary, to commission testing and monitoring of chemical substances as part of the regulatory framework”.

I.B.3. The Commission announced in its 2023 CWP a revision of the **Textile Labelling Regulation**. This exercise seems more limited than what we suggest in this study with the inclusion of key sustainability information (durability, recycled content, toxicity, microplastics release...): the Commission will “introduce specifications for physical and digital labelling of textiles, including sustainability and circularity parameters based on requirements under the proposed **Regulation on eco-design for sustainable products**”. The consumer is entitled to know the chemical components of risk in clothing and textiles. We recommend first to be inspired by the Californian law and to indicate the presence of dangerous products, "toxic, carcinogenic and mutagenic". The location of the production of the fabric and of the clothing also need to be dissociated if the two steps are not carried out in the same place. The materials must appear and leave no doubt about the mix of synthetic and natural fibers. For example, the 4% "other" mentions do not allow the consumer to know if the fabric can be recycled. The latter[25] is still pending. “It should provide for the setting of new ecodesign requirements to improve product durability, reusability, upgradability and reparability, improve possibilities for refurbishment and maintenance, address the presence of hazardous chemicals in products, increase their energy and resource efficiency, reduce their expected generation of waste materials and increase recycled content in products, while ensuring their performance and safety, enabling remanufacturing and high-quality recycling and reducing carbon and environmental footprints.” To continue with existing initiatives, it is crucial that legislators strike an ambitious agreement on the proposal for a Directive empowering consumers for the green transition through better **protection against unfair practices** and better information[26]. This new piece of legislation updating an old directive would “ensur[e] that traders do not mislead consumers about environmental and social impacts, durability and reparability of

[25] https://ec.europa.eu/info/energy-climate-change-environment/standards-tools-and-labels/products-labelling-rules-and-requirements/sustainable-products/ecodesign-sustainable-products_en#:~:text=The%20proposal%20for%20a%20new,only%20covers%20energy%2Drelated%20products.

[26] https://eur-lex.europa.eu/resource.html?uri=cellar:ccf4e0b8-b0cc-11ec-83e1-01aa75ed71a1.0012.02/DOC_1&format=PDF

products" and that to establish "a ban on making an environmental claim about the entire product, when it actually concerns only a certain aspect of the product".[27]

I.B.4. **Market surveillance authorities** are tasked to ensure in cooperation with customs that products on the market are conform to the applicable laws and regulations and comply with the existing EU health and safety requirements, including those mentioned in this study. They allow for a level playing field between EU and non-EU companies and for quality products at the disposal of consumers. "When national authorities find unsafe products, they impose measures or order the concerned economic operators to take action, in order to avoid that these products remain on the market and cause accidents. Depending on the risk identified, products can be rejected already at the borders by customs, a sales ban can be imposed or warning messages can be circulated. If the product is already in the hands of consumers, recall actions can be requested."[28] National market surveillance authorities cooperate with each other and report their findings on a portal, the so-called Safety Gate. Market surveillance authorities should intensify investigations on their own initiative or upon the request of the European Commission as to the toxicity of imported textiles, making use of information disclosed by the companies and allegations by stakeholders.

II. International Initiatives

II.1. A continuation of the 2013 and 2019 **Bangladesh Accord** on Fire and Building Safety, the International Accord for Health and Safety in the Textile and Garment Industry was set up in 2021[29]. It is a legally binding agreement between more than 180 garment brands/retailers and global trade unions to make textile and garment factories safe. The EU and member garment brands should support that it explicitly addresses the gender dimension and the use of chemical and other hazardous products in factories. On top of that, as contemplated in the Accord (paragraph 35), it should be expanded to other significant producing countries like India, Pakistan, Egypt, Morocco, etc.

[27] Another important proposal when it comes to textiles but going beyond the ambit of this very study is the one on the prohibition of products made with forced labour on the Union market.

[28] https://ec.europa.eu/info/business-economy-euro/product-safety-and-requirements/product-safety/product-safety-and-market-surveillance_en

[29] https://bangladesh.wpengine.com/wp-content/uploads/2021/08/1-September-International-Accord-on-Health-and-Safety-in-the-Textile-and-Garment-Industry-public-version.pdf

II.2. As described in the module on "trade unions and collective bargaining" of the OECD Due Diligence Guidance for Responsible Supply Chains in the Garment and Footwear Sector, the previously outlined recommendations can only bear lasting fruits if they go along with freedom of association and social dialogue at all levels so that workers and their representatives may have a say on the use of chemicals and less harmful alternatives, protection equipment. Complementary to the ongoing work on the due diligence directive (see below), the EU should ramp up its support to **Better Work**[30], a partnership between the UN's International Labour Organization and the International Finance Corporation, a member of the World Bank Group, Better Work brings diverse groups together – governments, global brands, factory owners, and unions and workers – to improve working conditions in the garment industry and make the sector more competitive. In the same manner but not only dedicated to the textile sector, lessons should be drawn from the functioning and the outcome of the **Vision Zero Fund** which is part of Safety & Health for All, an ILO flagship programme endorsed by the G20.[31] This strand of action is in conformity with the and the EU Action Plan Human Rights on Human Rights and Democracy 2020-2024 includes as a priority (point 1.4.i): "Promote decent work and a human-centred future of work through an updated EU approach ensuring the respect of fundamental principles and rights at work, the right to safe and healthy working conditions for all, (...) promote social dialogue and (...) Strengthen responsible management in global supply chains".

II.3. In December 2021, in view of the WTO Ministerial Conference (MC12) that was eventually postponed to June 2022, dozens of countries agreed to sign and promote **three plurilateral statements** on the Trade and Environmental Sustainability Structured Discussions (TESSD), the Informal Dialogue on Plastics Pollution and Sustainable Plastics Trade (IDP), and Fossil Fuel Subsidy Reform (FFSR). The EU is a Party to all three. In the same spirit, the EU could consider forging an alliance with other countries to promote circular and sustainable textiles. The backbone of this initiative could be the UN Alliance for Sustainable Fashion[32] designed to contribute to the Sustainable Development Goals. The statement should also envision the very early stage of the supply

[30] https://betterwork.org/
[31] https://www.ilo.org/vzf/
[32] https://unfashionalliance.org/

chain, that is cotton cultivation and harvesting where a phase out of pesticides and other toxic chemicals should be avoided.

Sumary of trade-related recommendations		
	EU initiatives	**International initiatives**
Hard power	- Dedicated concrete and detailed provisions in TSD chapters	- International Accord for Health and Safety in the Textile and Garment Industry (widened scope and geographical coverage)
	- Special focus in GSP	
	- EU mirror clause	
	- Strong provisions on textile as a high risk sector in the upcoming Corporate Sustainable Due Diligence Directive	
	- Tighten REACH and align it on the objectives of the European Green Deal	
	- Take the opportunity of the revision of the Textile labelling Regulation and complete the negotiations on the Regulation on eco-design for sustainable products and on the "Unfair Practices" Directive	
	- Revision of the Union Customs Code with special attention on goods possibly subject to a mirror clause and high risk sectors	
Soft power (or no need for legislative change)	- Technical and financial assistance (via NDICI and Aid for Trade)	- WTO plurilateral statement on circular and sustainable textiles (based on the UN Alliance for Sustainable Fashion a.o.)
	- Intensification of the activities of Market Surveillance Authorities on textile products - EU-US collaboration under the Trade and Tech Council in view of a better regulation of the sector	- Ramp up EU support to the UN and World Bank-driven "Better Work" and draw lessons from "Vision Zero Fund"

Conclusion

European regulations lag behind California state legislation. New York State is in the process of adopting California's regulations on toxic substances. The gigantic size of world trade and the difficulties of traceability indicate a need for legislation. It is not a matter of curbing global trade but of balancing it with sustainable standards for consumer health. They will also have a beneficial effect on Asian and South East Asian countries as they will impose sanitary standards on production sites and protect workers. Moreover, increased transparency within a value chain and to its consumers will also allow for more effective responses to changing market demands. This can also facilitate the creation of new markets tailored to the needs of consumers and the planet in a new circular economy.

Three main challenges have been identified regarding the implementation of transparency practices. First, the information disclosed or made visible is generally inconsistent or incomparable across different companies and organizations. There is a need to set minimum disclosure standards in order to achieve a common understanding of transparency practices regarding comprehensive supplier information. Pre-competitive industry collaborations or anti-competitive regulations should be used to encourage more companies to disclose relevant information in a more transparent manner. Third, the lack of transparency among value chain partners also leads to information inefficiencies. The most common outcomes of this implementation challenge are discrepancies between supply and demand. Requesting higher sanitary standards from Asian producing countries also means considering that clothing is not a low-end disposable commodity destined to pollute developing countries in landfills. A mirror clause would be a strong incentive to re-evaluate the impact of clothing and its price. The European Union can join the objectives of the UNO and boost actions in favor of sustainable development. The term "sustainable development" is often attributed to environmental issues. However, we have shown that human health is seriously affected by chemicals in textiles. Consumers must be protected from carcinogenic, toxic, and mutagenic effects.

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