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Environmental impact of the Swedish textile consumption

- a general LCA study

Jelina Strand

“**ESSENTIALLY, ALL MODELS ARE WRONG, BUT SOME ARE USEFUL**”

George E. P. Box, 1951

ABSTRACT

Environmental impact of the Swedish textile consumption – a general LCA study

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In order to reach the Swedish environmental quality objectives, the Environmental Protection Agency has expressed a desire that consumption must be highlighted. The difficulty of assessing the environmental impact of consumption lays in various calculation approaches, but one way to illustrate consumption is life cycle assessment (LCA). IVL, Swedish Environmental Research Institute (IVL) has an ongoing project together with Chalmers about Urban Metabolism, where different branches of consumption are highlighted. In the current situation, the textile industry accounts for approximately 2-10% of Europe's environmental impacts and until now, no complete LCA model over the Swedish textile consumption has been developed.

The main goal of this thesis was to develop a LCA model for the Swedish textile consumption and to study the environmental impact that the consumption entails. Using data from Statistics Sweden, net consumption between 2000 and 2013 was analysed. The results showed that clothing and household textiles account for the largest proportion of consumed textiles (68%) and cotton, wool, viscose, polyester and nylon are the most common fibres.

With the GaBi software a general life cycle model for the years 2000, 2007 and 2013 was developed. The model included 25 different clothing and household articles. For each article, the model covers raw material extraction, product manufacturing, use phase and waste management. The environmental impact categories; Acidification Potential (AP), Eutrophication Potential (EP), Global Warming Potential (GWP), Human Toxicity Potential (HTP), Terrestrial Ecotoxicity Potential (TETP) as well as energy and water use were analysed. The model showed that the production phase (including raw material production) has a great influence on the environmental impacts, but the use phase was equally important in certain impact categories. The major processes affecting the life cycle were energy use in manufacturing of the fabric, production of natural fibres, detergent as well as energy consumption in tumble dryers. With conscious decisions the consumer has great opportunities to influence the overall environmental impacts. In addition, increased recycling and reuse can potentially decrease the environmental impacts from the production stage.

The model is considered good enough for the results to be reliable and useful in order to predict the environmental impacts of the Swedish textile consumption. The results are also validated with results from other studies which increases credibility.

Keywords: Clothes, cotton, household, life cycle assessment, nylon, polyester, Swedish consumption, textile, viscose, wool

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Referat

Miljöpåverkan av den svenska textilkonsumtionen – en övergripande LCA studie

Jelina Strand

Det står idag klart att endast två av Sveriges 16 miljömål kommer att nås till 2020. För att Sverige ska uppnå sina miljömål har Naturvårdsverket uttryckt en önskan om att konsumtion måste belysas. Svårigheten med konsumtionens miljöpåverkan är att den inte kan mätas direkt men ett sätt att angripa problemet är att studera konsumtion genom livscykelanalys.
IVL, Svenska Miljöinstitutet (IVL), har tillsammans med Chalmers ett pågående projekt om Urban Metabolism där olika typer av konsumtion nu belyses. Textilier är en typ av konsumtion och i Europa står den marknaden för 2-10 % av den totala miljöpåverkan. Då textilkonsumtionen är relativt stor i Europa är det därför intressant att studera hur den svenska textilkonsumtionen ser ut.

Denna studie ämnade att skapa en modell för svensk textilkonsumtion och studera dess miljöeffekter. Med data från Statistiska centralbyrån kunde nettokonsumtionen mellan 2000-2013 beskrivas. Statistiken visade att kläder och hushållstextilier står för den största delen konsumerade textilier (68 %) och att bomull, ull, viskos, polyester och nylon är de fibrer som används mest.

Med programvaran GaBi gjordes en generell livscykelanalysmodell för åren 2000, 2007 och 2013. 25 olika kläder och hushållsartiklar ingick och processerna råvaruframställning, tillverkning av produkt, användning och avfallshantering studerades.
Miljöpåverkanskategorierna försurning, övergödning, global uppvärmning, humantoxicitet, ekotoxicitet samt energi-och vattenanvändning analyserades och resultatet visade att produktionsfasen (inklusive råvaruframställning) har stor påverkan på resultatet. I vissa kategorier var även användningsfasen en betydande faktor. De processer som påverkade livscykelanalysen mest var energianvändningen i tygtillverkningen och naturfibrerna samt tvättmedlet och energianvändningen hos torktumlaren i användningsfasen. Med medvetna val har konsumenten stor möjlighet att påverka de övergripande miljöeffekterna och med en ökad återvinning och återanvändning kan miljöeffekterna i produktionsfasen minska.

Modellen som togs fram är inte fulländad och vissa processer kan förbättras för att utveckla modellen vidare. Däremot antas modellen vara tillräckligt bra för att resultatet ska vara trovärdigt och användbart i syfte att studera den svenska textilkonsumtionens miljöeffekter. Resultaten kan dessutom styrkas med resultat från andra studier vilket ökar trovärdigheten.

Nyckelord: Bomull, hemtextil, kläder, livscykelanalys, nylon svensk konsumtion, textil, polyester, viskos, ull

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PREFACE

This report presents the final part of the Master Programme in Environmental and Water Engineering at Uppsala University and Swedish University of Agricultural Sciences (SLU). The report was commissioned by IVL Swedish Environmental Research Institute and supervisor was Tomas Rydberg from Organizations, Products and Processes at IVL Swedish Environmental Research Institute. Subject reviewer was Cecilia Sundberg, researcher, Department of Energy and Technology at SLU, Swedish University of Agricultural Sciences.

I would like to thank all employees at IVL and especially my supervisor Tomas Rydberg for believing in me, Felipe Oliveira for his patient with GaBi, Jenny Lexén for her guidance, Maria Elander for her support and Sven-Olof Ryding for his involvement and help with environmental quality objectives.

I would also like to thank my subject reviewer Cecilia Sundberg at SLU. Her guidance was valuable when obstacles occurred.

Finally, gratitude is directed to family and friends for their support and encouraging words. This thesis has been wonderful journey and great lessons have been learnt during the way. In August will I start my first engineering job and it is with excitement I enter a new chapter in life.

Jelina Strand
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POPULÄRVETENSKAPLIG SAMMANFATTNING

Miljöpåverkan av den svenska textilkonsumtionen – en övergripande LCA studie

Jelina Strand

Konsumtion av varor och tjänster orsakar miljöproblem både globalt och regionalt. Ändliga resurser används, miljögifter släpps ut och utsläpp av växthusgaser bidrar till den globala uppvärmningen. Däremot är inte all konsumtion av ondo men när det överkonsumeras blir det ofta ohållbart. Det viktiga i konsumtionen är att belysa vilka miljöeffekter som uppstår och försöka minska dem i största möjliga mån.

Naturvårdsverket hävdar att det inte går att nå Sveriges 16 miljömål om man inte belyser konsumtion. Idag står det dessutom klart att endast två av de 16 miljömålen kommer att nås till 2020 så något måste göras. IVL Svenska Miljöinstitutet och Chalmers har därför ett pågående projekt om Urban Metabolism där de studerar konsumtion i olika nivåer, från nationell nivå till regional och urban nivå. I dagsläget saknar IVL en komplett modell för den svenska textilkonsumtionen och de vill också ta reda på möjligheter och svårigheter med olika konsumtionsmodeller. Då 2-10 % av de europeiska miljöproblemen är orsakade av textilkonsumtionen är det därför intressant att studera den svenska textilkonsumtionen.

Syftet med den här rapporten var att göra en livscykelanalysmodell över den svenska textilkonsumtionen och studera vilka miljöeffekter konsumtionen ger upphov till. Med livscykelanalys menas att man studerar en produkt från vaggan till graven, dvs. från att råvaror framställs och produkten produceras till att den används och avfallshanteras. För att studera miljöeffekter av textilkonsumtionen valdes fem miljöpåverkanskategorier ut, samt energianvändning och vattenanvändning. Miljöpåverkanskategorierna är försurning, övergödning, global uppvärmning, humantoxicitet och ekotoxicitet. Det finns fler miljöpåverkanskategorier att studera men dessa är bland de vanligaste miljöpåverkanskategorierna inom textilkonsumtion.

För bakgrundsdata till den svenska textilkonsumtionen behövdes statistik från Statiska centralbyrån. Mellan 2000-2013 var det svårt att utläsa en trend för den totala textilkonsumtionen men för kläder och hushållsartiklar, som utgör den största andelen av textiler (68 %), fanns en tydlig ökande trend. Eftersom kläder och hushålltextilier representerade majoriteten av konsumerade textilier fick de ingå i den livscykelanalysmodell som utvecklades i programvaran GaBi. Totalt studerades 25 olika artiklar gjorda av de fem mest använda fibrerna; bomull, ull, viskos, polyester och nylon. Komplexitet i systemet gjorde att endast konsumtionen för år 2000, 2007 och 2013 analyserades mer detaljerat.

Resultatet av modellen visade att produktionsfasen har störst miljöpåverkan men att användningsfasen också har stor betydelse för vissa miljöpåverkanskategorier. Transporter och avfallshantering är mindre betydande. I produktionsfasen är det främst energianvändningen i

tygtillverkningen och framställningen av naturfibrerna bomull och ull, som påverkar resultatet hos de olika miljöpåverkanskategorierna. I användningsfasen är det tvättmedlet och energianvändningen i främst torktumlaren som påverkar.
Vattenanvändningen var svår att analysera eftersom den är beroende av var vattnet hämtas ifrån. Ett land med brist på vatten påverkas mer än ett land som har vatten i överflöd. Eftersom geografiskt läge inte var inkluderad i den här studien var det därför svårt att dra någon slutsats om vattenanvändningen.

Modellen som togs fram är inte fulländad och vissa processer kan förbättras för att utveckla modellen vidare. Bland annat antogs alla studerade textiler vara producerade enligt samma process, med samma garntjocklek och att alla tyger var vävda. I verkligheten är detta inte sant då garntjocklek varierar från produkt till produkt och tyger kan både vara vävda, stickade eller virkade. Modellen innehöll inte heller någon återvinning av textilier eftersom det i dagsläget knappt sker någon återvinning i Sverige. För att förbättra modellen och studera vilka potentialer återvinning har bör det inkluderas om modellen ska utvecklas vidare. Modellen antas ändå vara tillräckligt bra för att studera vilka miljöeffekter den svenska textilkonsumtionen ger upphov till. Resultaten kan dessutom bekräftas med liknade rapporter vilket ökar trovärdigheten.

Slutsatsen blev att det går att begränsa miljöeffekterna av den svenska textilkonsumtionen och att konsumenten kan påverka mycket genom att göra medvetna val. Förbättrade teknologier och ökad återanvändning och återvinning kan också minska miljöeffekterna. Trots att textilkonsumtionen inte är en av de största orsakerna till världens (och Sveriges) miljöproblem så påverkas ändå några av Sveriges miljömål av den svenska textilkonsumtionen. I första hand tros begränsad klimatpåverkan, frisk luft, giftfri miljö, ingen övergödning och bara naturlig försurning vara de miljömål som påverkas av en förändrad textilkonsumtion.

ABBREVIATIONS

AP Acidification Potential

ALCA Attributional LCA

CN Combined nomenclature

CLCA Consequential LCA

EP Eutrophication Potential

EPA Environmental Protection Agency

GWP Global Warming Potential

HTP Human Toxicity Potential

ICP Industry commodity production

ISO International Organization for Standardization

JRC European Commission Joint Research Centre

LCA Life cycle assessment

LCI Life cycle inventory

LCIA Life cycle impact assessment

SEA Swedish Energy Agency

SEPA Swedish Environmental Protection Agency

SIC Swedish Standard Industrial Classification

TEKO Swedish Textile and Clothing Industries Association

TETP Terrestrial Ecotoxicity Potential

n.d no date

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1. INTRODUCTION

1.1 BACKGROUND

Consumption in all forms affects the environment in one way or another. The Swedish Environmental Protection Agency (SEPA) believes that it is not possible to reach sustainable development i.e. Sweden´s environmental quality objectives, unless consumption is highlighted (SEPA, 2005). In fact, only two out of sixteen environmental quality objectives will be reached by 2020 (Environmental Objectives, 2015). In Europe, food and drink, transportation and private housing account for 70-80 % of the environmental impacts of consumption and clothing contributes to 2-10 % (Tukker. A et.al, 2006).

Since SEPA has expressed a desire to gain more knowledge about the national consumption, the Swedish Environmental Research Institute (IVL) and Chalmers University of Technology have an ongoing project about Urban Metabolism. One of the goals in the Urban Metabolism project is to study how to account for consumption in different ways, from national consumption to consumption in municipalities or cities. IVL is in 2015 supervising three master thesis projects, all dealing with different types of consumption and this thesis focuses on textile consumption.

There are different approaches accounting for environmental impacts of consumption, e.g. input-output analyses, environmental accounts, carbon-water and ecological footprint and life cycle assessment (LCA) (SEPA, 2011). Each has different advantages and disadvantages and there is no method with precise answers. The benefits of LCA lie in the possibility to identify hotspots across the entire life cycle and to include several environmental impacts at the same time. IVL is using LCA as a tool for many situations, e.g. consumption analyses, and until now, no complete LCA has been developed on the Swedish textile consumption.

1.2 AIMS AND OBJECTIVES

This thesis aims to develop a general LCA model for the Swedish textile consumption and investigate the environmental impact that the consumption entails. The main objectives for this master thesis was to

- Identify the Swedish textile consumption with data from Statistics Sweden
- Make one general LCA model suitable for selected products and fibres
- Analyse the environmental impact due to Swedish textile consumption

1.3 Scope

The time frame of this work was 20 weeks. In order to make a functional and general LCA model, compromising with data was necessary. The LCA model did not include mixed materials and only considered 100 % of some selected fibres.
This study focused on end products and excluded disposables and products partly containing textile. Disposables are assumed to have no environmental impact in the use phase and products partly containing textile, e.g. furniture, are too complex to include.

1.4 Approach

To achieve the aim and objectives, the report was divided into three parts. Initially a literature study was performed to describe the concept of textiles. Secondly, data was collected from Statistics of Sweden to categorize different fibre products. Using data on imports, exports and Sweden's own production, a flow model of the Swedish textile consumption was produced. The fibres and products representing the most of the textile consumption were identified, for use in the life cycle assessment.

Finally, a life cycle assessment was performed with data from Statistics Sweden, Ecoinvent, PE International and other scientific reports. GaBi software tool was used for life cycle modelling.

1.5 Previous studies

Two similar reports have been done on the Swedish textile consumption.
Palm. D et.al (2013) performed a consequential life cycle analysis on the Swedish textile consumption for 2011 and 2013. The report focused on the waste management phase and evaluated environmental effects of reuse, recycling and energy recovery of textiles. The report did not take use phase into consideration and only included three different fibres (Palm. D et al, 2013).

The other report was conducted by the European Commission and the Joint Research Centre (JRC) and evaluated the environmental improvement potential of textiles in the EU-27 (Beton. A et al, 2014). This report will do a similar study applied for the Swedish textile market.

2. THEORY

This section clarifies the structure of textiles and that consumption can be identified with statistics. In order to combine the textile consumption with environmental impacts an LCA can be performed using universal standards and modelling software tools, in this case GaBi.

2.1 WHAT IS TEXTILE?

Textile is more than clothing and home textiles like bed sheets, towels or curtains. Swedish Textile and Clothing Industries Association, TEKO, believes that there are three dimensions of textile: fashion and clothing, home furnishings and technical textiles (Teko, n.d). Within technical textiles categories you find articles in recreation, such as tents and backpacks; medical textiles such as gauze and sanitary towels; protective textiles and textile products in the food- agriculture- transportation and construction industries (Willbanks. A, n.d).

A textile product is made of textile fibres. Fibres are twisted into threads, merged into tissue and finally converted into a textile product (Wiklund. S & Diurson. V, 1971) . The characteristics of the fibres determine the quality and appearance of the product and depend on several parameters: thickness, length, strength, formability, gloss or ability to isolate heat is crucial to the end result (Wiklund. S & Diurson. V, 1971).

Fibres can be divided into natural, man-made and inorganic fibres (Figure 1). Inorganic fibres such as asbestos and glass wool have been found hazardous for human health and are therefore not suitable for e.g. clothing or home textiles (Ragnar. R & Jäder. J, 2011). Inorganic fibres are more often used in building materials such as isolation against heat, cold and sound (Swedisol, n.d).

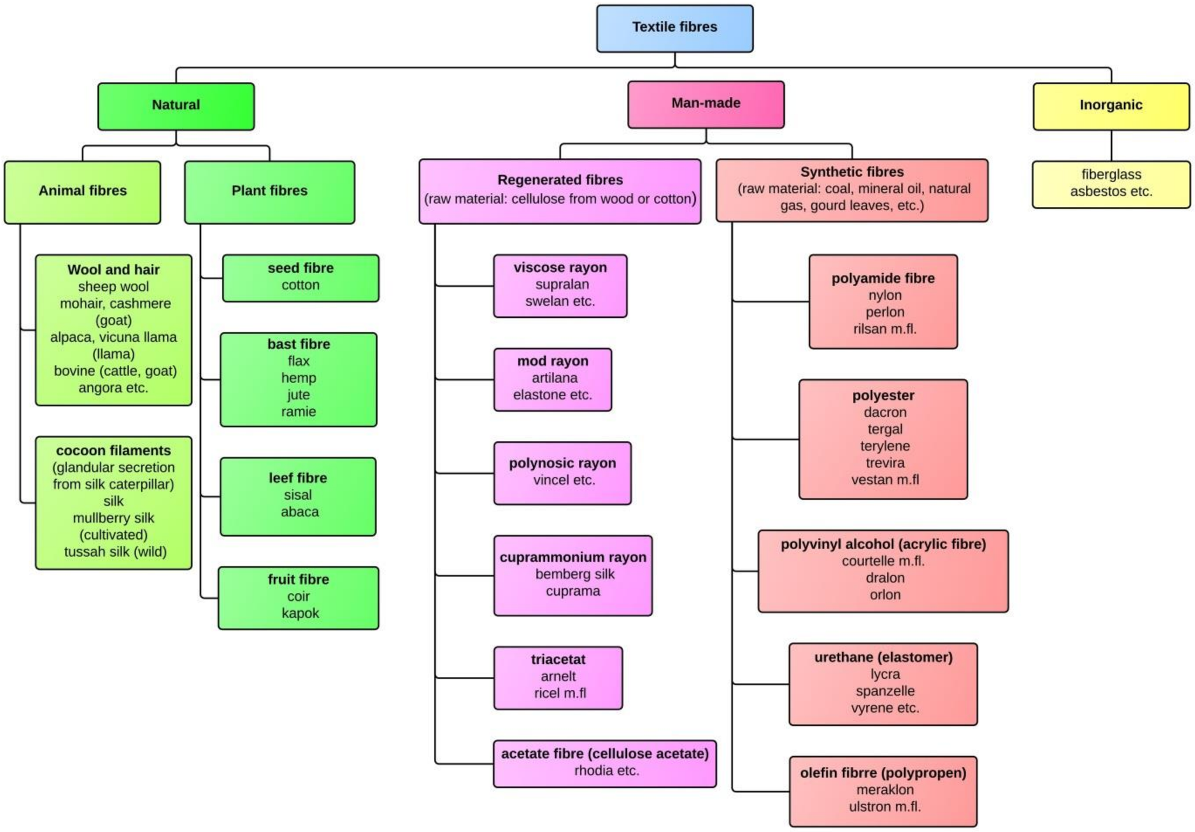


Figure 1 *Classification of textile fibres. Source: Own illustration after Wiklund.S & Diurson.V (1971).*

Natural fibres can be classified into animal or plant fibres. Wool and silk are derived from the animal kingdom while e.g. cotton, flax and hemp are developed from the plant kingdom. Man-made fibres are produced wholly or partly by chemical means and are classified under regenerated - or synthetic fibres (Wiklund. S & Diurson. V, 1971). Regenerated fibres are made from nature e.g. cellulose and protein, but are chemically converted into different fibre materials. Synthetic fibres are produced by breaking raw material into chemical compounds, often oil or natural gas. With high pressure and high temperature chemical compounds solidifies into fibre form (Brinder. P, 1965)

Seen from a global perspective, the fibre consumption in 2014 was dominated by cotton, viscose, wool and synthetic fibres (Figure 2).

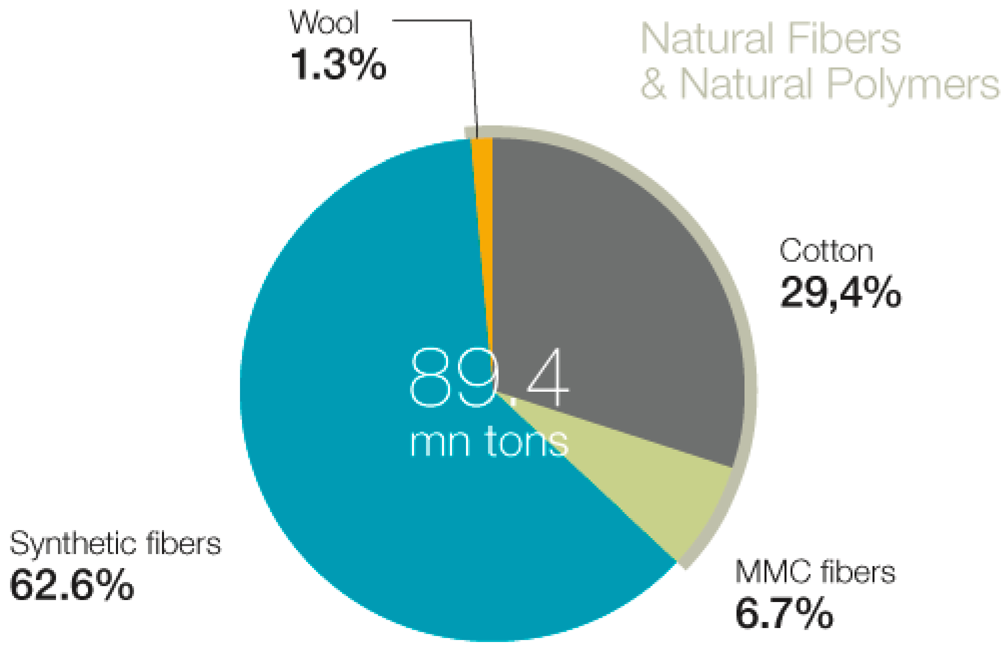


Figure 2 *Composition of world fibre consumption 2014, in percentage. (MMC = man-made cellulose fibres) Source: Lenzing (2014).*

2.2 Life cycle of textiles

The life cycle of textiles varies from product to product and depends on what the product will be used for, their quality and life time (Muthu, SS, 2014). Generally, the life cycle of textiles can be divided into four different phases; raw material production, textile manufacturing, use phase and waste management (Figure 3) (Muthu, SS, 2014).

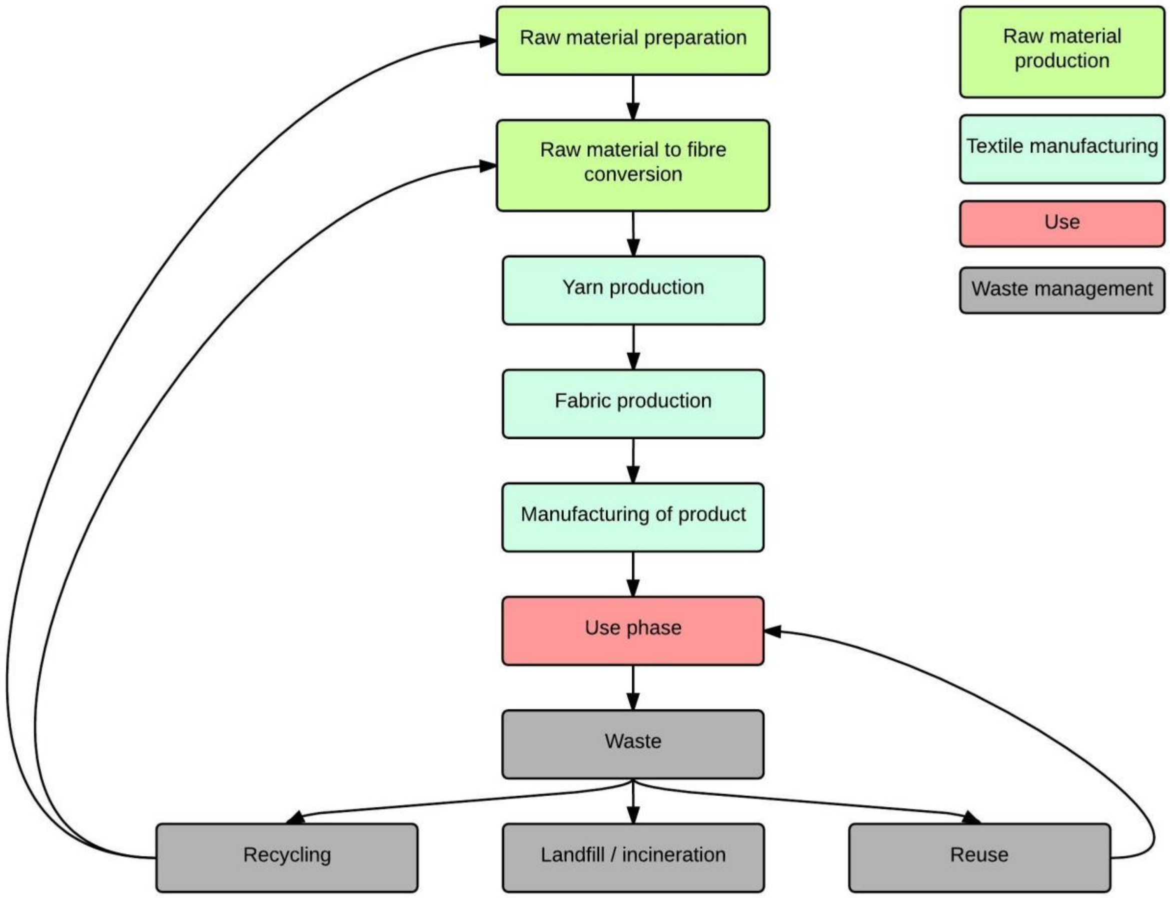


Figure 3 *The life cycle of textile. Source: Own illustration after Muthu. S.S (2014).*

Fibres are extracted in the raw material production phase and the method differs if the fibre is derived from natural - or man-made fibres.
For the production of textiles, the process can be divided into three different phases where each part constitutes an environmental impact in one way or another (Encyclopedia, n.d). Yarn manufacture, fabric manufacture and production of the end product requires energy, water, dying, shearing, trimming etc. The environmental impact depends mainly on fibre type and technological approaches (Wiklund. S, 1984). The use phase is self-explaining but it also includes storage and cleaning of product. The waste management is the end of life treatment for the textile product where it can be reused, recycled or destroyed.

2.3 Swedish consumption

The Swedish Environmental Protection Agency defines consumption as the final use of a product or service (SEPA, 2011). Consumption can be both publicly and privately and this report studies both types of consumption and no distinction was made between them.

The European Commission´s Joint Research Centre (JRC) has made a report on the European textile consumption and on various environmental improvement potentials for textile (Beton. A et al, 2014).

The report defines consumption according to:

$$\textit{Net Consumption} = \textit{National Production} + \textit{Imports} - \textit{Exports} \quad (1)$$

The same assumption was made in this report and statistics for the net consumption can be downloaded from the national website of Statistics Sweden.

2.4 Statistics Sweden

Statistics Sweden is nationally responsible for all official and state statistics (Statistics Sweden, n.d,a). The database from Statistics Sweden supplies statistics for Swedish imports, exports and national production, so-called industry commodity production (ICP).

To identify and categorize different merchandise, products and services are divided into various commodity codes:

- *SIC - Swedish Standard Industrial Classification* is an economic classification and is used to classify establishments and companies based on their economic activity (SCB, n.d, b).
- SPIN - *Swedish product classification by industry* is a classification of products with the same characteristics. It classifies the products by origin of production and is based on the European CPA, Classification of Products by Activity (Statistics Sweden, n.d, c).
- CN – *Combined nomenclature* is the classification for goods and services associated with import and export. CN is used in for all EU countries and is also used in the Integrated Tariff of the European Communities (TARIC) (Swedish Custom Service, n.d).
- *SITC- Standard International Trade Classification* is the UN classification for international trade and is used in most countries (Swedish Custom Service, 2009) . The commodity codes from SITC are derived from CN and since SITC is not amended annually, it enables comparisons over longer time periods (Swedish Custom Service, 2009).

For consumption of textiles CN is used. CN is the most detailed classification and is commonly used in all EU countries for export and import. The CN-numbers are divided into 98 different commodity groups and can be subdivided into four different levels where the level of detail increases with the number digit code (Statistics Sweden, 2013). The Nomenclature is amended or revised annually due to renewed or replaced products (Swedish Custom Service, n.d).

2.5 Life Cycle Assessment

The first life cycle assessments were made in the late 60´s and covered energy calculations in chemical processes (Rydh. C-J et al, 2002). Today, a life cycle assessment is used to identify environmental impacts of a product at various stages in its life cycle. It can also be a good tool to estimate how different changes will affect certain stages, and use the result for marketing or decision making (Carlson. R & Pålsson. A-C, 2011). International Organization for Standardization (ISO) has developed a standard that facilitates comparisons between different life cycle assessments. According to ISO 14 040 a life cycle assessment should be structured in four phases (Figure 4):

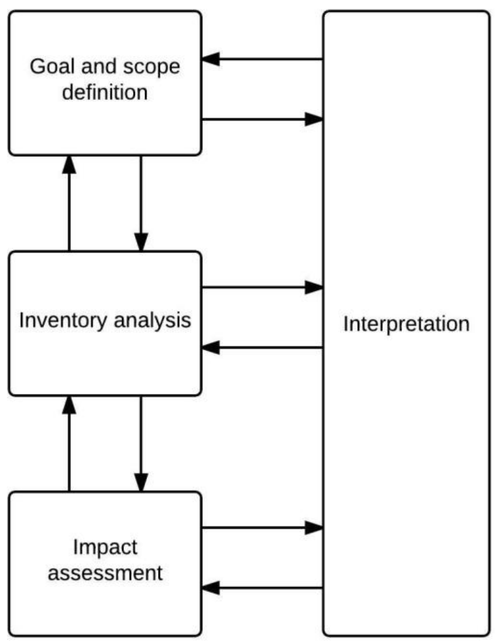


Figure 4 *Life cycle assessment framework according to ISO 14040.Source: Own illustration after ISO (2006).*

An LCA first contains a goal and scope definition where intended use, the system boundary, level of detail, functional unit etc. are specified. The system boundaries should include boundaries against natural systems, other life cycle systems, geographical area and time horizon (Rydh. C-J et al, 2002). The functional unit is a calculation base for the entire LCA and reflects the function and usefulness of a product (Carlson. R & Pålsson. A-C, 2011).

In the life cycle inventory (LCI) phase all necessary input/output data is collected to meet the goal of the study.

The third phase of a LCA is the life cycle impact assessment phase (LCIA), where the LCI results are collected to better understand the product system´s environmental impact. The final stage is the Interpretation where results of LCI and/or LCIA are summarized and analysed in order to draw conclusions and make recommendations (ISO, 2006). The Interpretation is a continuous process that occurs throughout the entire life cycle assessment and affects the other processes along the assessment.

There are different ways in approaching a LCA and the most common are the Attributional LCA (ALCA) and the Consequential LCA (CLCA). The ALCA considers only the direct environmental impacts of the processes used to consume (produce, use, disposal) a product. A CLCA covers also the indirect consequences of a consumed product. ALCA is more suitable for consumption based emissions and facilitates comparisons between different products. CLCA is used for decision making, since a CLCA analyses the consequences both inside and outside the system boundaries of a product (Brander. M et al, 2009).

2.6 GaBi

The GaBi software tool (GaBi 6) is produced by PE International and was used in this report to make LCA models for the Swedish textile consumption. PE International supplies complete databases with over 4,500 predefined processes representing most industries (PE International, 2012). In addition to their own databases, GaBi is connected to the Ecoinvent database, one of the world´s biggest suppliers of LCI data.

GaBi is built by connecting *processes*, *flows* and *plans*. *Processes* are used to combine different stages in a product´s life cycle and include input-and output *flows*. Processes are represented in one or several *plans* where the result can be calculated (PE International, 2012).

For example: The plan “yarn” includes the processes “raw material production” and “spinning of yarn”. Each process contains a number of input and output flows and the result is a balance of all flows for all processes.

3. METHOD: SWEDISH CONSUMPTION FROM STATISTICS SWEDEN

In order to build a model of the Swedish textile consumption, it was necessary to identify and categorise the amount and fibre distribution of textiles. Data was taken from Statistics Sweden and based on the end product and fibre type; approximately 900 commodity codes were divided into different categories and subcategories. Data for the years 2000-2013 was used to get an idea of which textiles, and thus fibres, Sweden consumes the most. The years were selected to minimize random annual deviations and to identify a possible trend.

3.1 IMPORT AND EXPORT

The import and export is specified in different levels, CN2-CN8, and the level of detail increases with the level of CN. For CN2-CN6 the statistics is adjusted for non-response, which means that a certain loss has been taken into consideration. Companies importing or exporting below a certain value[1] are not required to declare data to Statistics Sweden. Those companies, as well as non-response, are estimated by Statistics Sweden as shortfall adjusted values. Unadjusted values are thus slightly underestimated and the annual losses are in general around 3-5% for imports and 1-3% for export (Surtin. C, 2009). CN-8 contains unadjusted data while CN 2-CN6 is adjusted and therefore more accurate.

To minimize the risk of shortfall all (98) CN commodity groups on CN6-level were inventoried. Disposables and textiles partially containing textiles (bandages, furniture, buttons, zippers etc.) were excluded due to various reasons, mentioned in section 3.4.

3.2 PRODUCTION OF COMMODITIES AND INDUSTRIAL SERVICES

In addition to export and import, Statistics Sweden supplies data for Sweden's national commodity production, the so-called industry commodity production (ICP). Companies are required to report their production if they have more than 20 employees. Companies with a turnover of 50 million (incl. VAT) must also declare their production, regardless of the number of employees (Statistics Sweden, n.d, d).

At the CN 6 level, the output was either classified or production was missing. Looking further down at the CN 8, data were available for "deliveries in quantity" or "total production in quantity". “Deliveries in quantity“ means all the goods produced during the year but also goods produced previous years which have been sold that specific year, i.e. stock items (Strömberg. M, 2013). “Total production in quantity” refers to all goods produced, whether they have been sold or not. Total production is only demanded for a few CN- numbers so “deliveries in quantity” was used. (Strömberg. M, 2013).

[1] A yearly import < 9 000 000 SEK
A yearly export < 4 500 00 SEK

3.2.1 Change of unit in ICP

Imports and exports were declared in tonnes but the unit varied for the ICP. Some commodity codes were declared in pieces, 1,000 pieces or tonnes while others in m^2 or 1,000 m^2. The unit for CN8 was not reported in the statistical database but the information for each CN and year were available in a separate file on SS's website (Statistics Sweden, 2014).

To correlate the ICP to import and export, different approaches were made to convert other units into tonnes. In general, all clothing was declared in pieces or pairs and could easily be calculated into tonne using their specific weight. A general assumption was made for all articles in the same category e.g. all shirts, regardless of fibres, were assumed to have the same weight. For more detailed information about each product and weight, see Appendix A2.

For some CN categories half of the yearly data was declared in tonne while the other half was declared in e.g. 1,000 m^2. In those cases, when no other data was available, a mean value was taken for both tonne and 1,000 m^2. An approximation was then made that 1 tonne represented xx m^2 and no consideration was taken to density or economic situation. The greatest approximation was made for floor coverings. In this category, only one article could be recalculated so the same approximation was made on all other articles in the same category. However, ICPs with other units than tonne were relatively small in comparison with exports and imports so it should not have limited the impacts on the total results.

3.3 Classification of fibres

To get the idea of which fibres Sweden consumes the most, a classification of different fibres was needed. In most cases, each CN code belongs to a specific fibre, e.g. cotton or polyester. In the absence of fibre affiliation the CN code were categorized as “unspecified”.

Table 1 shows an example of a product of man-made fibre that was proportionally distributed to the most common consumed man-made fibres in Sweden; polyester, nylon and viscose (based on the final result, see chapter 6).

Table 1 Example of man-made fibres

CN code	Description
630293	Toilet linen and kitchen linen of **man-made fibres** (excl. floor cloths, polishing cloths, dishcloths and dusters)

Some CN codes did not contain a fibre affiliation at all so these CN codes were allocated to “unspecified fibres”. Based on the final result (chapter 6) these unspecified fibres were allocated to the most commonly consumed fibres. Table 2 shows an example for products with unspecified fibres.

Table 2 Example of unspecified textiles

CN code	Description
610310	Men's or boys' suits of **textile materials**, knitted or crocheted (excl. tracksuits, ski suits and swimwear)
630229	Printed bedlinen of **textile materials** (excl. cotton and man-made fibres, knitted or crocheted)

The latter example (CN 630229) in Table 2 is unspecified but contains information that the printed bedlinen is not made of cotton or man-made fibres. This has been neglected and been allocated to the most common fibres, including cotton and man-made fibres, since it would only complicate the work load and not contribute to new results.

3.3.1 Assumptions

In those cases when a product is defined as "regenerated fibre" an assumption was made that the fibre was viscose. This because viscose is the dominating regenerated fibre and other fibres in that category were rarely mentioned.

3.4 Net consumption

The net consumption was divided into different commodity groups allocated into different fibres. The Following CN groups contained textiles but were excluded due to various reasons:

- CN 64 (Footwear) belongs to another consumption area and is the subject of another study at IVL.
- CN 65-67 (Headgears, umbrellas, parasols, wigs etc.) was delimited because of a net consumption significantly smaller than other groups.
- CN 68 contained only inorganic fibres and thus a lot of building material which belongs to another consumption area.
- CN 30 and CN96 include medical textiles where the majority are disposals and that is not included in this report.

For the complete distribution of textiles in CN6-level, see Figure 8 *Classification of Swedish textile consumption according to CN* in Results (chapter 6).

3.4.1 Cut off

With the intention of making a general model a cut-off was needed in some cases. If a certain commodity group contained a fibre with less than 4 % of the total amount (with respect to weight) a cut-off was made. The specific fibre was allocated to “undefined/unspecified fibres” and was later proportionally distributed to the top consumed fibres, based on their relative distribution. The cut-off at precisely 4 % was made since the data set had a clear distinction at that level. Generally the fibres represented <4 % or >4 %.

4. METHOD: LIFE CYCLE ASSESSMENT

Based on the result of the Swedish textile consumption (chapter 6), an LCA was done on 68 % of the Swedish textile consumption. The other 32 % were unfinished end products and were not included.
25 different end products and five different fibres; cotton, wool, viscose, polyester and nylon were included in the LCA (Table 3).

Table 3 The most consumed fibres and end products in Sweden

FIBRES		
Cotton Wool Viscose Polyester Nylon		
CLOTHING		**Expected life time [No. of washes]***
Tops	Shirts	50
	Jumpers	50
	T-shirts	25
Jackets	Jackets	20
Bottoms	Trousers	67
Underwear	Negligées and bathrobes	24
	Nightdresses and pyjamas	52
	Socks, briefs and panties	104
	Slips and petticoats	40
Suits, Blazers etc.	Suits	40
	Blazers	40
	Ensembles	40
	Costumes	40
Dresses, skirts	Dresses	15
	Skirts	24
Training	Tracksuits and ski suits	12
Accessories	Gloves	4
	Handkerchiefs	0
	Scarves	12
	Ties	0
HOUSEHOLD TEXTILES		**Expected life time [No. of washes]***
Bed linens		80

Towels	100
Table lines	25
Curtains	20
Floor coverings	5
***For references: see Appendix A2**	

As mentioned in section 2.5, an LCA can be conducted in different ways. An attributional LCA was done since the assessment studied the direct environmental impacts of the processes. Also, an attributional LCA is more suitable for consumption based emissions and the result was not a basis for any decision.

4.1 Goal, scope and functional unit

The goal with this LCA was to make a general and simplified model and to identify the environmental impact of the Swedish textile consumption.

Some unrealistic assumptions were made: all consumption during one year was assumed to go through the entire life cycle that specific year and no storage of goods was assumed, which is not the case in reality. For example: one kg cotton shirts were assumed to be manufactured, used and put to waste during the same specific year. In reality one kg cotton shirt is used over several years but this could not be modelled. All environmental impacts therefore takes place at the same year and are not spread over several years.
Compromising with data was also needed in order to implement the model within the time frame of the project. Statistics were available for 2000-2013, but detailed statistics required a lot of calculations, why the LCA of textile consumption was modelled over only three years; 2000, 2007 and 2013. The only parameter changing was the fibre distribution and the amount of textiles. This selection was done since it would be too time consuming to model all years between 2000 and 2013 and more years would not contribute to new results.

Since Statistics Sweden supply data in weight the functional unit was *consumption of one kg textile.*

4.1.1 System boundaries

The following system boundaries have been used:
Nature system boundaries
The LCA intends to study textile products from cradle to grave. The products are both active and passive where an active product has its biggest environmental impact during use phase and a passive product has the greatest impact during extraction phase (Lindahl. M et.al, 2002). The main stages of the life cycle are:
Raw material production. All fibres are predefined processes and include the “cradle to gate” of the extracted fibre.
Manufacturing of textile product. The production of end products includes spinning of yarn,

transportations, manufacturing of fabric and the making of end products. The processes include electricity, heat, sizing agents, dyeing and material losses.

Use phase. This phase includes transportation to Sweden, washing, drying and the amount of detergent needed for each wash.

Waste management. The textiles were assumed to go to incineration or landfill. This includes transportations to waste management and a system expansion in order to obtain the energy and heat that is being produced.

Geographical boundaries

Since the model is very general, global processes for transportation, raw material and production phase have been used as far as possible. For use phase and waste management Swedish processes or behaviour patterns have been used.

Process system boundaries

Constant technical performance was assumed during the studied time period 2000-2013. The technology has most likely developed during these years but for simplification no variations were assumed.

4.1.2 Available data and depth of study

In order to build a model suited for all 25 different end products, compromising with data was needed. Relevant data was used whenever possible but the quality of geographical, time related and technological data differed.

4.1.3 Allocation

Some processes generate more than one product and these co-products, and their environmental impact, should not be included in the studied system. In order to exclude the environmental burdens of co-products, an allocation of emissions was needed. Allocation can be done by economical-or physical allocation or via system expansion (Rydh. C-J et al, 2002).

Allocation was avoided to the greatest extent but a system expansion was done in the waste management phase. The waste contains resources that can be used in other systems and a system expansion allows energy and heat recovery from incineration and landfill.

4.2 Impact assessment categories

Five different environmental impact categories have been chosen to identify the consequences of the input and output flows of the Swedish textile consumption. In addition, water use and energy demand have also been identified. The chosen impact categories were selected due to their common use in textile life cycle assessments. The water and energy use was included to get a better understanding about the energy and water distribution. Other impact categories may be relevant, but delimitations were needed.

The impact categories were quantified according to the impact assessment method CML 2001 (Gabi, n.d). Other methods are available but CML 2001 was used due to its common use, both globally and at IVL.
The following impact categories were analysed:

4.2.1 Acidification

With acidification, pH in waters is lower than normal and acidification occurs on a regional and local level. Acidification can be natural but it is the anthropogenic effect that causes environmental problems, e.g. a negative impact on ecosystem and erosions of materials (SwAM, n.d).
The Acidification Potential (AP) is calculated by converting LCI data to hydrogen (H+) equivalents (EPA, 2006). Example of LCI data for acidification is Sulfur Oxides (SOx), Nitrogen Oxides (NOx), Hydrochloric Acid (HCl) and Ammonia (NH_4^+).

4.2.2 Eutrophication

Eutrophication describes the unnatural increased input of nutrients in waters and occurs on a local level. The sources of eutrophication are often fertilizers and manure carrying nitrogen and phosphorus, and the environmental effects are oxygen deficiency or release of toxins (Henry. B, 2011). The Eutrophication Potential (EP) is calculated by converting LCI data to phosphate (PO_4) equivalents (EPA, 2006). Example of LCI data for eutrophication is Phosphate (PO_4^-), Nitrogen Oxide (NO), Nitrogen Dioxide (NO_2), Nitrates and Ammonia (NH_4^+).

4.2.3 Global warming

Global warming, or climate change, refers to the effect that greenhouse gases has on increasing the global temperature. The Global Warming Potential (GWP) can be calculated by converting LCI data to carbon dioxide (CO_2) equivalents and the GWP can for 50, 100 or 500 years' time horizons (EPA, 2006). Example of LCI data for global warming is Carbon Dioxide (CO_2), Nitrogen Dioxide (NO_2) and Methane (CH_4).

4.2.4 Human Toxicity

Humans can be affected by toxics in different ways, e.g. via air, food or fluids. The Human Toxicity Potential expresses the health effects from exposure of a unit of chemical, related to dichlorobenzene [kg DCB- eq.]. The potential factor is calculated with respect to fate and exposure of a chemical and is predicted on a daily intake (ingested or inhaled) (Krewitt. W et al, 2002).

4.2.5 Terrestrial Ecotoxicity

Terrestrial Ecotoxicity is a measurement of how toxic different substances are to animals and plants in an ecosystem. Like Human Toxicity, different substances affect the environment in different ways. Ecosystems are sensitive to outer exposure in various ways and depend on how chemicals are spread and accumulated in plants and animals. Terrestrial Ecotoxicity is measured with the same characteristic factor as for the Human Toxicity Potential, [kg DCB-eq.] (SLU, 2013).

4.2.6 Primary energy demand

The primary energy consumption in a life cycle reflects the total energy input per unit of production and is not an indicator of the environmental damage that it causes (Henry. B, 2011). The energy demand was divided into renewable and non-renewable resources, measured in [MJ].

4.2.7 Water use

Water use is the amount of water used to produce a product and it can be measured in "blue", "green" and "grey" water. The distribution clarify if the water comes from surface and groundwater (blue), rain water (green) or if the water is used to dilute pollution (grey) (SIWI, 2010).

GaBi delivers data for water use and water consumption and there is a difference between them. Used water is returned to the system while consumed water is a withdrawal of water, i.e. lost water in the ecosystem. From an impact assessment perspective the freshwater consumption is most interesting because natural resources may be limiting. In GaBi, the freshwater use includes the freshwater consumption and the polluted water use. The consumed freshwater refers to the evaporated water, evapotranspiration from plants, integration of freshwater into products and the release of freshwater into the sea (GaBi, 2014).

Unlike freshwater use, blue water only includes surface and groundwater and no considered is taken to rain water. This is because rain water generally is assumed to have no environmental impact (green water). (GaBi, 2014)

5. LIFE CYCLE INVENTORY (LCI)

The Life cycle inventory included both predefined and unfinished processes. In total, approximately 25 different processes were used and a complete list can be found in Appendix B. Processes represented by "Global" means that the process is derived from a global perspective and with global conditions. "EU-27" means that the process is applied for the conditions in Europe.

5.1 PROCESS FLOW CHART

The main stages and processes in the life cycle of textile are represented in Figure 5. The Flow chart is applied to all 25 textile end products and the only difference was the fibre distribution between products, amount and life time.

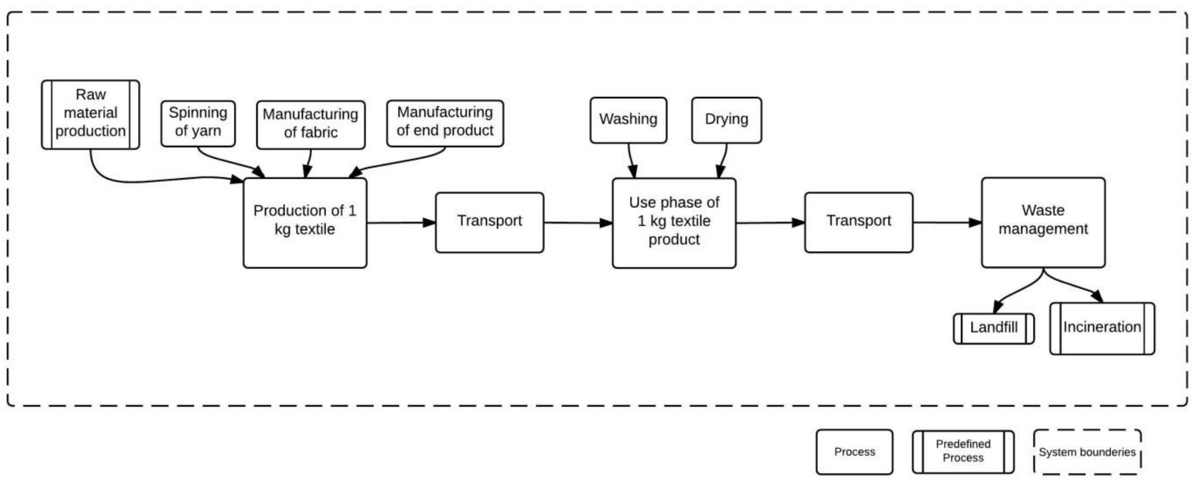


Figure 5 *Flow chart of the Swedish textile consumption*

The life cycle consists of three major processes; production, use phase and waste management. The production (section 5.4) includes raw material extraction, spinning of yarn, manufacturing of fabric and the production of the end product. The use phase (section 5.5) includes the washing and the drying of the products and waste management (section 5.6) includes the final processing of the textiles. In addition to the three processes some transportation are included (section 5.8).

5.2 NET CONSUMPTION

The net consumption for 2000, 2007 and 2013 can be seen in Table 4 and the data is derived from Statistics Sweden. A more detailed product specific table can be found in Appendix A.

Table 4 Total net consumption of consumed textiles

	2000	**2007**	**2013**
Net consumption [tonnes]	113,230	150,366	143,913

5.3 ENERGY CONSUMPTION

Almost all processes contain energy use in form of a European (EU-27) electricity mix (Figure 6) or a Swedish electricity mix (Figure 7). The electricity mix is region specific and shows the available energy in different proportions.

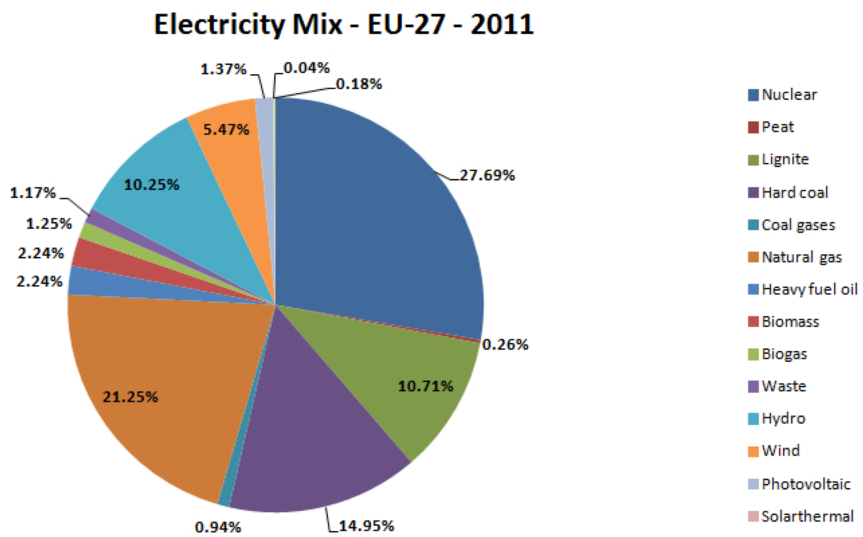


Figure 6 *EU-27 electricity grid mix Source: PE International*

The EU 27 electricity mix mostly consists of nuclear power (27.69%), natural gas (21.25%), hard coal (14.95%), lignite (10.71%) and hydro (10.25 %). Other resources are wind (5.47%), biomass (2.24%) and waste (1.17%), Data for was taken from PE International (2006). The EU electricity mix was used for the processes in the production phase (section 5.4 and 5.5).

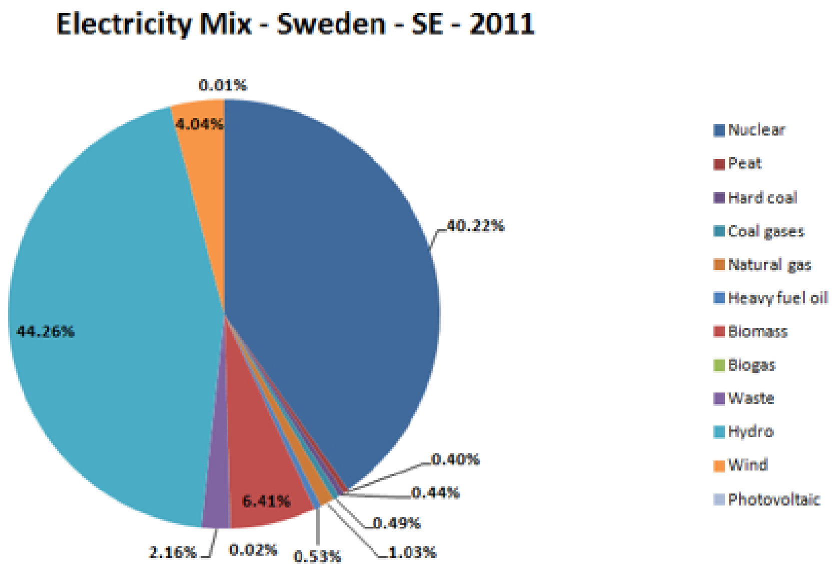


Figure 7 *Swedish electricity grid mix Source: PE International*

The Swedish electricity mix mostly consists of nuclear power (40.22%) and hydro power (44.26%). Other major resources were wind (4.04%), biomass (6.41%) and waste (2.16 %). Data was taken from PE International (2006). The Swedish electricity mix was used in the use phase (section 5.6) and for the energy recovery in waste management (section 5.7).

5.4 RAW MATERIAL PRODUCTION

The following section describes the raw material production of cotton, wool, viscose, polyester and nylon.

5.4.1 Cotton

Cotton is one of the most consumed fibres in the textile industry with 29 % of the total market (Lenzing, 2014). To make cotton fibre, large quantities of water, energy, land, pesticides and fertilizers are needed (Muthu, S.S, 2014). Cotton production alone uses 2.5 % of all cultivated land and about 25 % of all insecticides (WWF, 2005) .

Data for cotton fibre was taken from PE International (2006). The production covers all input and output data relevant for “cradle to gate” LCI. The data represents a global average of raw material production including cultivation, irrigation, harvest, fuel consumed e.g. equipment and all relevant transportation processes. The cultivation process includes fertilizers, pesticides, seeds and transportation. The data exclude farm buildings and agricultural infrastructure.

5.4.2 Wool

Data for wool production was taken from Ecoinvent and represents the average sheep wool production in USA for the years 2001-2006 (Ecoinvent Centre, 2007). USA does not belong to the major top producing countries but was used since the data was easily accessible (IWTO, n.d).

The LCI may affect the final result since it is not representing a global average.
The data set includes the production of 1 kg of wool and a by-product of live weight. An economic allocation was done with a factor of 22.8% to wool. One sheep is assumed to deliver 4.2 kg wool/year and 62.8 kg live weight /head and year). Other by-products such as manure, slaughter co-products or milk are not included in the data.

The shorn wool contains a lot of grease and needs to be washed (scouring) before turning it into yarn. Approximately 50 % of the total weight can be lost when the grease is removed from the fleece (Blackberry Ridge, n.d,a). The proportion varies since dirt, grease and vegetable matter varies from different farms and different countries. The data set does not specify if the wool includes washing but an assumption was made that it was.

5.4.3 Viscose

Viscose is derived cellulose or cotton and is converted to fibres by chemical means.
The viscose fibre production was taken from Ecoinvent and represents a Global average of spinnable viscose (1997-2007) (Ecoinvent Centre, 2007). The data comes from an Austrian company but their production takes place in different countries so a global approximation could be assumed. The viscose fibre production delivers by-products of sodium sulphate and sulphuric acid which were allocated on the basis of economic parameters (compare section 4.1.3).

5.4.4 Polyester

Polyester is the most consumed synthetic fibre and it is made of fossil oil and is therefore not renewable (NRDC, 2011). Data for polyester fibre production was taken from PE International (2006) and represents an average EU-27 production of Polyethylene terephthalate fibres (PET). The data set includes the "cradle to gate" inventory and the Polyethylene terephthalate is produced from Dimethyl terephthalate (DMT) and ethylene glycol. Methyl alcohol is as a co-product that is included in the production of dimethyl terephthalate. The data set also includes spinning of PET and a surface treatment with a sizing agent (epoxy resin (EP)). All relevant and known transportations are included.

5.4.5 Nylon

Nylon was primary invented to replace silk and today are there several types of nylon on the market, e.g. Nylon 6.6 (Muthu, S.S, 2014). Like polyester, the production of nylon is derived from oil.
Data for nylon was taken from PE International (2006) and represents an average EU-27 production of Polyamide 6.6 (PA 6.6; Nylon 6.6). The data set includes the cradle to gate inventory and the nylon is derived from hexamethylene diamine (HMDA) and adipic acid via AH-salt (salt from adipic acid and HMDA). The data set also includes the spinning of fibres and surface treatment. All relevant and known transportations are included.

5.5 TEXTILE MANUFACTURING

Manufacturing a textile product requires spinning of yarn, fabric manufacture, finishing processes and apparel manufacturing (Muthu, S.S, 2014). All these processes include a large amount of emissions and depend on how and where they are made. Transportations, chemicals, energy and water are some resources required, and that differs from product to product. Due to the numerous different products, some limitations were needed. All products were assumed to be manufactured with the same technology and with the same input and output emissions. In reality this is not true but simplifications were made in order to complete the production.

5.5.1 Spinning

The spinning process generally includes opening, carding, pre-bending, stretching, roving and spinning (Ellebæk Laursen. S et al, 2007). According to Ellebæk Laursen. S et al (2007), energy consumption, fibre waste, use of spindle oil and dust are the major environmental aspects to consider for a spinning mill.

The energy consumption for spinning yarn differs, e.g. if the yarn is used for knitted or woven fabric and what the linear mass density (decitex[2]) for the yarn is. Koç. E and Kaplan. E (2007) calculated the energy consumption for the production of eight different yarns and distinguished combed or carded yarn and if the yarn was used for knitted or weaved fabric. The energy consumption increases when the decitex decreases (finer yarn requires more energy/kg yarn). Table 5 shows the mean values of their findings.

Table 5 Specific energy consumption for spinning of chosen yarns, kWh/kg
(own calculation based on Koç. E and Kaplan. E (2007)).

	Specific energy consumption for chosen yarns, kWh/kg			
Yarn count, decitex[2]	**Combed**		**Carded**	
	Knitting	Weaving	Knitting	Weaving
24	2.98	3.57	2.90	3.40
Total average = 3.21 kWh/kg unspecified yarn (11.6 MJ/kg unspecified yarn)				

Since the specific energy consumption did not differ significantly between different methods, an average value of 3.21 kWh/kg produced yarn was used. The EU-27 electricity mix was assumed.

The material losses when spinning yarn can be as much as 20 % for cotton and 2-3 % for polyester (Kalliala. E & Nousiainen. P, 1999). The material losses in wool spinning are approximately 10 % (Blackberry Ridge, n.d,b). For simplification, a material loss of 10 % was assumed for the total spinning process, regardless of fibre type.

[2] Decitex (Dtex): measuring unit for yarn: [1g/10000 m]

5.5.2 Weaving

There are many ways of manufacturing a fabric. One can knit, weave or produce products of nonwovens, and the techniques differ. The overall environmental impacts are slightly higher for the weaving process than for the knitting process, and this is mainly because of the used sizing agents (van der Velden. N et al, 2012) (Fletcher. K, 2014) . Only one general scientific study could be accessed on weaving; according Koç and Çinçik (2010) weaving 1 kg of material requires 5.06 kWh/kg (energy) and 9.85 kJ/kg (thermal energy).

In addition to energy and heat, sizing agents are used to improve the strength of the yarn and to reduce the friction in the weaving process (EDIPTEX, 2007). A report from Jelse. K & Westerdahl. J (2011) state that 225 g starch / kg textile is used for the weaving process. No other data for sizing agents was found on this subject, so this model contains a use of 225 g starch / kg textile. Data was taken from PE International (2006).

3-8 % of material losses are assumed in the weaving process for cotton towels (Blackburn. R & Payne. J, 2004). For simplification a general loss of 5 % was applied.

5.5.3 Finishing

The finishing process requires as much as 1 kg chemicals and auxiliaries per kg of finished textile (Muthu, S.S, 2014). Fibre type and fabric material determines the effluent of different chemicals and it is therefore complicated to apply specific a value in this study.

According to a study by Blackburn. R & Payne. J (2004) approximately 0.35 kg of dyeing chemicals per kg fabric is required in the finishing process. The same report states that the total dyeing and finishing requires 30.8 MJ/ kg textile. The energy consumption includes singeing, brushing, dezising and washing, scouring, bleaching, mercerizing, dyeing, padding and stentering. The data was applied on cotton towels but was used for all textiles in this report because no other data was found.

3-10 % of material loss is assumed in the dyeing and finishing process of cotton towels (Blackburn. R & Payne. J, 2004). For simplification, a general material loss of 5 % was assumed.

The dyeing process is extremely complex and a fabric can be dyed in many ways. In this study, direct dyes were assumed because it can be used for several different fibres (Teonline, n.d). Data for the process of “Direct dyes” was taken from PE International (Gabi 4.0) and the amount was assumed to be 0.350 g /kg fabric. For the electricity in the finishing process data for the EU27 Electricity mix was used and data were taken from PE International.

5.5.4 Manufacturing of end products

Since this LCA studied 25 different end products it was impossible to go into detail how each product were sewn.

There are hardly any official reports about manufacturing textile end products. One report from Sule. A (2012) says that the energy consumption for cutting and sewing a cotton T-shirt requires 2.47 MJ/ kg textile. Since no other data was found, the same value was assumed for all other end products in the LCA model.

Lack of data for material losses in this phase was also an issue. Blackburn. R & Payne. J (2004) states that 5-20 % of material loss is assumed in the making of cotton towels. Another report state that 8-10 % are lost when cutting and sewing a cotton or polyester shirt (Cartwright. J et al, 2011). For simplification, a material loss of 10 % was assumed to all textiles in this report.

5.6 USE PHASE

When the textile product reaches the use phase, the consumer has a great impact on how the environmental impacts will proceed. The assumption was made that a textile was exposed to washing and drying during its life time. Ironing, softener or dry cleaning were not taken into consideration since it is not necessary in order to continue further use. Floor coverings can be cleaned by a vacuum cleaner, but this was not taken into account since vacuum cleaning is often associated with house cleaning.

When washing and drying a textile, the amount of water, energy, and chemicals is essential to identify the environmental impact. Another important aspect is the life time of the textile, i.e. how many times a textile is washed and dried during its use phase (Beton. A et al, 2014). This study assumes that the life time is only based on the number of washes. The textiles are not assumed to be ragged during use, and storage has no effect on the environmental impacts.

5.6.1 Washing

The Swedish Energy Agency's (SEA) Test lab was commissioned by the National Consumer Agency to investigate four different washing machines in energy efficiency classes A to A ++ (SEA, 2009a). All the machines were run with a program of 60 degrees Celsius for cotton and Table 6 shows the mean value of the results.

Table 6 *Mean values of four different washing machines (own calculation)*

Washing temperature [°C]	60.0
Capacity [kg/cycle]	7.1
Energy consumption [kWh/cycle]	1.2
Water consumption [l/cycle]	59.0
Energy consumption [kWh/kg textile]	0.17
Water consumption [l/kg textile]	8.3

Even if the capacity for a single wash is approximately 7 kg, SEA believes that only 2.5 (35 %) kg is washed normally (SEA, 2009a). It was assumed that the machines did not adjust the energy or water consumption to the load of textiles, in order not to underestimate the environmental impacts in the use phase.

Data for Swedish electricity mix and tap water from EU27 were taken from PE International (2006). Swedish tap water was not available in GaBi.

5.6.2 Detergent

Detergents can be used in liquid- or powder form, and the composition of chemicals differs between labels. According to Maria Stareborn[3] at Unilever, the Swedish detergent consumption is distributed in 1/3 liquid detergent and 2/3 powder detergent (Stareborn, 2015). For simplification, a consumption of 100 % powder detergent was assumed. No analysis has been made on the differences, but it may be interesting to investigate further.

Testfakta, a Swedish independent research company has tested eight powder detergents, and the average use for one wash was 39 grams detergent (Testfakta, 2013). An assumption was made that 39 gram detergent represented the average load of 2.5 kg. For one kg washed textile, 15.6 gram was used.

According to Bourrier. C et.al (2011) washing detergent contains 27 % zeolite, 23 % sodium carbonate, 21 % water, 16 % perborate tetra hydrate and 12 % perborate mono hydrate. The same assumption was made for this report, and data for processes (GLO and RER) were taken from PE International (2006).

5.6.3 Tumble drying

The Swedish Energy Agency also performed a test on six different tumble dryers and Table 7 shows the results from the test (SEA, 2009b).

Table 7 *Mean value of six different tumble dryers (own calculation)*

Capacity [kg/cycle]	6.5
Energy consumption [kWh/cycle]	4.8
Energy consumption [kWh/kg textile]	0.74

For the electricity a Swedish electricity mix was assumed and data was taken from PE International.

[3] Personal communication (2015-03-10)

5.6.4 Sewage treatment

The wastewater from the washing machine was assumed to be purified in a medium sized wastewater treatment plant. The data for the treatment plant was taken from PE International (2006) and was made for a Swiss technology in 2000. The treatment plant is however applicable to other countries in Europe. The treatment plant had an average capacity size of 24,900 per-capita- equivalents [PCE] and the polluted load is measured in the total polluted load of water per 24 hours.

5.6.5 Tap water

The tap water used in the model was tap water from ground water, valid in the EU-27 region, and data was taken from PE International (2006).

5.6.6 Life time of products

The lifetime of products depends on which type of product it is, fibre and quality. This report assumes a life time based on the number of washes and for simplification, no consideration has been taken to fibre type or quality. For example: no distinction was made between cotton shirts and polyester shirts, their life time was assumed to be 50 washes each.

Floor coverings have different life time depending on what they are used for. Bathrooms rugs can easily fit into a washing machine, but big and heavy carpets are more difficult to clean. Such carpets are probably dry cleaned and dry cleaning is not included in this study. The CN classification of floor coverings is poorly detailed, and is not divided into sub categories, which made it difficult to distinguish between different types of carpets. A general assumption was made that floor coverings had an expected life time of 5 washes. In the reference report from JRC the assumption was set to zero washes but since some floor coverings actually are washed, is was better to take some washes into consideration instead of neglecting all of them. The assumption may be an underestimation.

For more detailed information about life time of different products, see Appendix A2.

5.7 End-of-life management

At this stage, the product is regarded as waste and the attitude of the consumers determine the environmental impact. A consumer can choose between three different options (Muthu, S.S, 2014):

- Leave it for reuse
- Leave it for recycling
- Send it to incineration and landfill

5.7.1 Reuse

According to Elander et.al (2014) approximately 20 % of all consumed textiles in Sweden are collected and reused. Compared to Denmark who collects 46 % and Germany 80 % Sweden is behind (Palm. D, 2014).

In 2013, SEPA compiled a proposition for new milestones for textile and textile waste. Their goal is to increase the reuse to 40 % for all textiles put to market in 2020 (SEPA, 2013). By 2018, their expectation is that numerous accessible collection systems are available to ensure the reuse of textiles. This proposition is still under investigation and no decision has been made yet.

Reuse is already included in the estimated life time of different textile products. For simplification, no transportation was assumed between primary use and secondary reuse.

5.7.2 Recycling

Today, few Swedish municipalities collect textile waste for recycling and lack of efficient technology and logistic problems are two major reasons (SEPA, 2013).
This field is developing fast though and by 2020, SEPA strives to recycle 25 % of all textiles put to market (SEPA, 2013). Again, no decision has been taken yet so the percentage is only an estimation.

No recycling was assumed since data is very poor on the subject. The expectation is that recycling of textiles will increase drastically and then, this model can be developed further.
The environmental benefits with recycling would e.g. be less demand of raw material production. Recycled polyester saves petroleum and requires less energy than virgin fibres. On the other hand, the production cost is 15-20 % higher and the quality is not as good as virgin polyester (NRDC, 2011). Cotton is extremely resource demanding in terms of water and pesticides, and recycled cotton can reduce the pollution and save recourses. But again, the quality of recycled cotton is an issue that needs to be improved.

5.7.3 Incineration and landfill

The Swedish municipal waste management (MSW) is characterised by recycling, incineration and landfill (EEA, 2013). Since textiles are not yet included in recycling, only incineration and landfill were assumed for this disposal phase. Textiles are mainly put into incineration, but there may be some toxic textiles put to landfill.

During 2000-2010 the amount of waste going to landfill has been reduced from 22 % in 2000 to 1 % in 2010 (EEA, 2013). For simplification, approximately 95 % of the waste went to incineration and 5 % went to landfill in the LCA model.

From the waste management an energy recovery was assumed, and to include the energy back to the system a system expansion was made. The waste incineration resulted in an electricity and heat recovery. In the system expansion thermal energy was recovered from biomass since biomass was assumed to have a less direct environmental impact than e.g. fossil fuels.
The landfill of textile also resulted in an energy recovery. Data for predefined processes of incineration and landfill of textiles were taken from PE International (2006) and was valid for the EU27 region. The recovered energy and heat in the system expansion was taken from PE International (2006) and was valid for Sweden.

5.8 TRANSPORTATION

The emissions from transportations are affected by carried distance, means of transportation and extent of logistics (Klöpffer.W & Grah.B, 2014). In addition to included transportations in mentioned processes, two other transportations were assumed: Transportation 1 (T1) from production to use phase and Transportation 2 (T2) from use phase to waste management.

The report from JRC states that approximately 92 % of all textile products are imported by maritime means (Beton. A et al, 2014). For simplification 100 % was assumed. T1 was given a default value of 13,000 km based on the average distance from major global ports to Sweden. The vessel used for T1 was a global process of bulk carrier with 1,500-20,000 dead weight tonnes (dwt) payload capacity. Data for emissions were taken from PE International and included the input of cargo and heavy fuel oil and the output of cargo and combustion emissions. The vessel production and its disposal were not included in the data. Neither was the fuel supply chain.

The process "Transportation 2" was assumed to link produced yarn with manufacturing of fabric and worn out products with waste management. A default value of 50 km using a truck was assumed. Data for a diesel driven truck (34 - 40t gross weight / 27t payload capacity) was taken from PE International. The truck production and its disposal were not included in the data. Neither was the fuel supply chain.

5.9 KNOWN DATA GAPS

The model consists of several known data gaps that may affect the result. The most crucial data gaps lies in the production phase regarding the amount of chemicals, sizing agents, dyeing, material losses and manufacturing techniques. The use phase does not take fibre distribution into consideration which may underestimate some assumed life times. In waste management recycling is not included and that may affect the result. Some transportation has also been neglected between some processes, which further affect the results.

6. RESULTS

This section presents statistics about the Swedish net inflow between 2000 and 2013, and what environmental impact the consumption entails. The analysed environmental impacts are Acidification Potential, Eutrophication Potential, Global Warming Potential, Human Toxicity Potential, Terrestrial Ecotoxicity Potential and additional impacts are energy demand and water use.

6.1 THE SWEDISH CONSUMPTION

The Swedish net consumption was identified by a breakage of different CN-categories. The following results show the background data used for the LCA.

6.1.1 Classification of textiles

Based on data from Statistics Sweden approximately 900 commodity codes on CN6-level were divided into eight different categories (Figure 8). Six groups were excluded due to various reasons discussed in chapter 3.4.

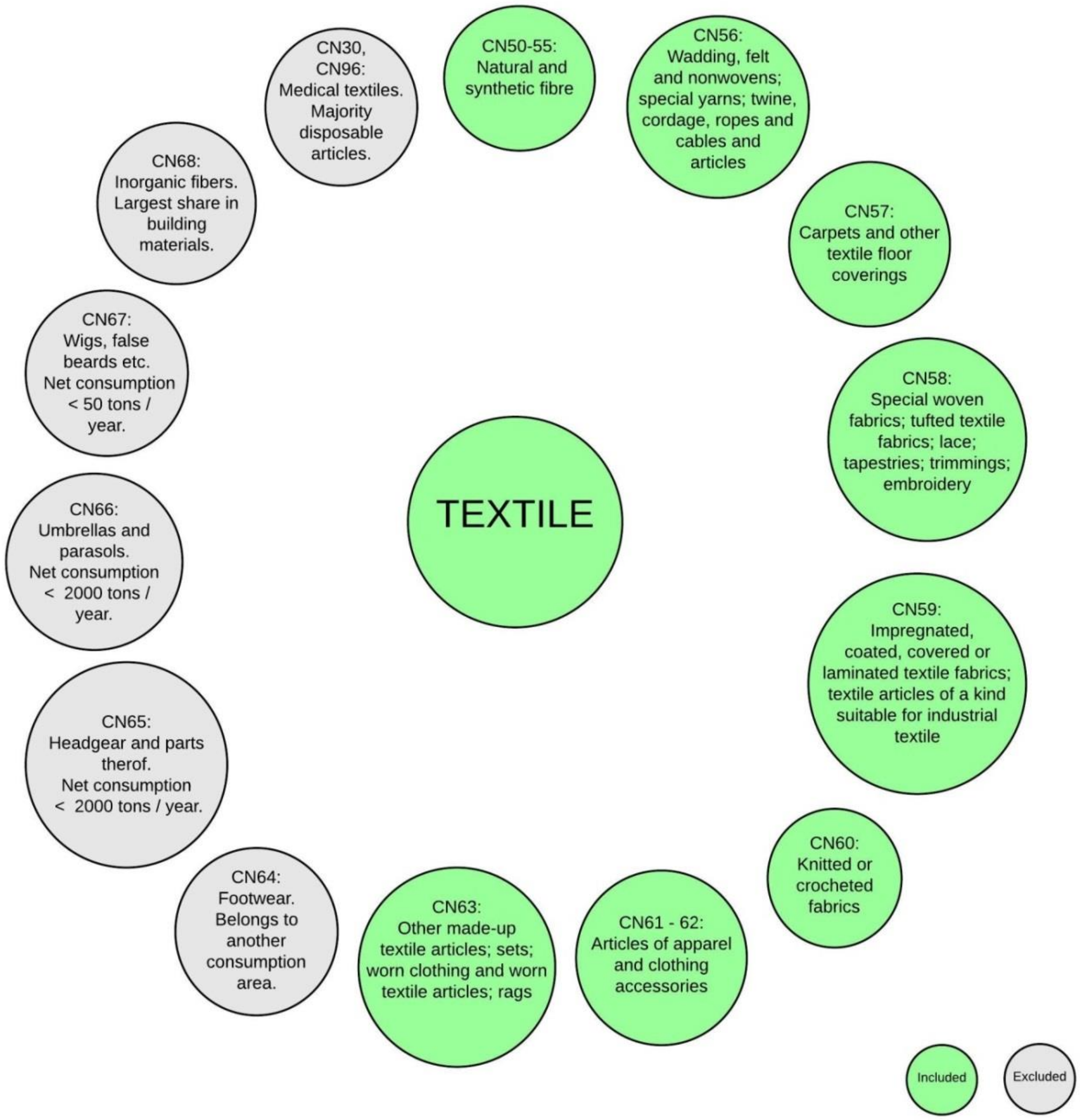


Figure 8 *Classification of Swedish textile consumption according to CN (own illustration)*

Statistics from Statistics Sweden shows that the Swedish textile consumption consists of ready-made end products (clothing and household textiles), semi-manufactured products (fabrics) and input products (yarn).

6.1.2 Net consumption

The accumulated net consumption between the years 2000-2013 was calculated (Figure 9). The result was based on the eight CN-categories (Figure 8) and their import, production and export. Data was taken from Statistics Sweden. Figure 10 shows a detailed distribution of the accumulated net consumption.

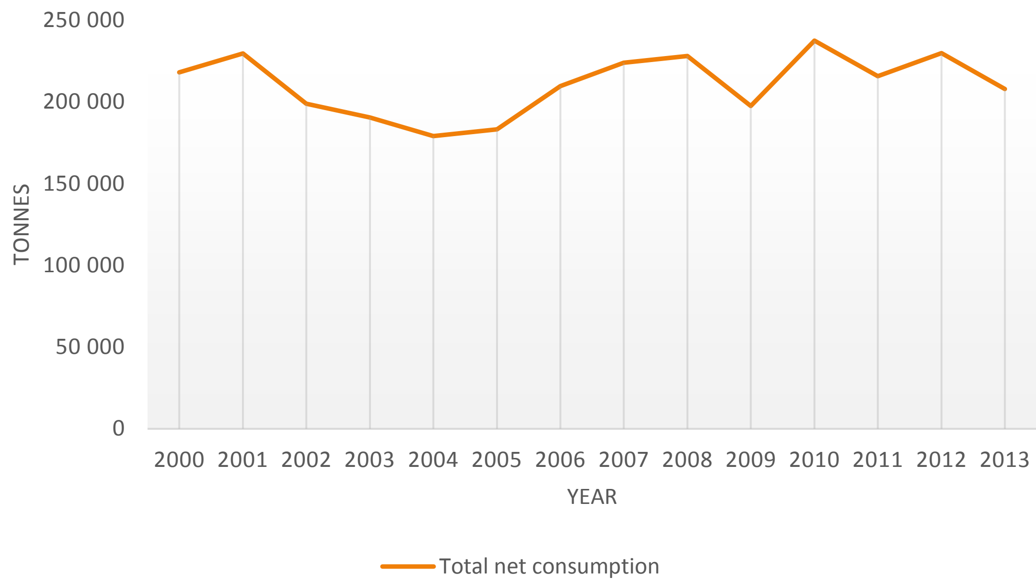


Figure 9 *The accumulated Swedish textile consumption between the years 2000-2013 (based on Statistics from Statistics Sweden and own calculations)*

No clear trend was found for the total net consumption between 2000 and 2013 (Figure 9). Fluctuations can be seen in the figure which may explain the lack of a trend.

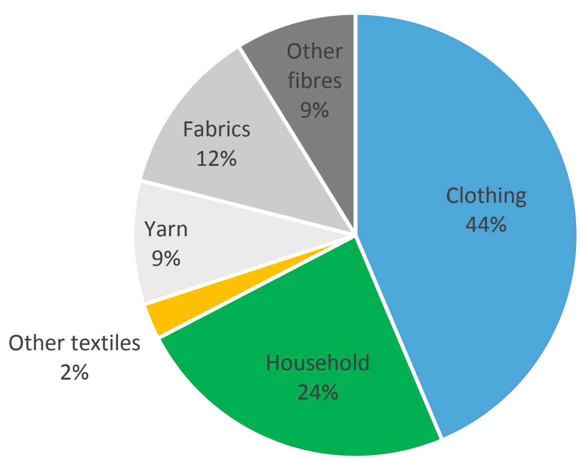


Figure 10 *Net consumption of different textile groups. Based on the accumulated data between the years 2000-2013.*

The net consumption was divided into different end products (Figure 10). Clothing and household textiles represents the largest share (68%) of the textile consumption. Fabrics, yarn and other fibres represents 30 % and are unspecified end products. Only 2 % of the textiles were products other than clothing and household textiles (e.g. textile walls or fire hoses).

Since the clothing and household textiles represented the largest share they were included in the LCA study and the remaining 32 % were not studied.

6.1.3 Classification of Fibres

For the chosen CN codes (Figure 8), a breakdown of their fibre distribution was necessary. The accumulated Swedish fibre consumption shows that 49 % is man-made fibre, 41 % is natural fibres and 10 % is unspecified (Figure 11).

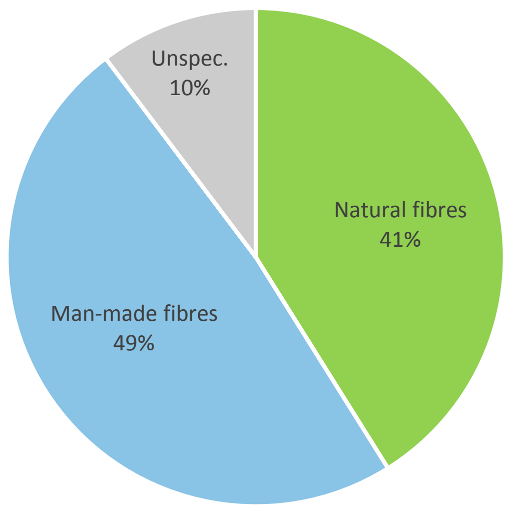
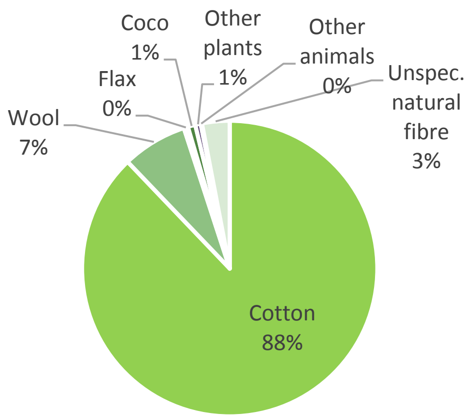


Figure 11 *Breakdown of fibre consumption between the years 2000-2013*

The unspecified fibres (10 %) were proportionally allocated to other fibre categories. Below, Figures 12 and 13, show a more detailed breakdown of the fibres.



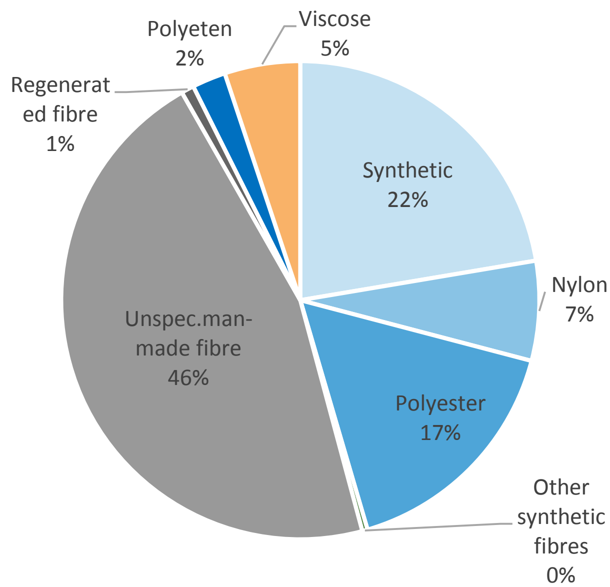


Figure 12 *Breakdown of man-made fibres (0% represents 0% < fibre < 1%)*

Figure 13 *Breakdown of man-made fibres (0% represents 0% < fibre < 1%)*

Again, unspecified fibres are proportionally allocated to other fibre categories. Man-made fibres have a large percentage of unspecified fibres (Figure 13). This allocation may result in an uncertainty for the final results.

The aggregated distribution for the Swedish fibre consumption is cotton, wool, viscose, polyester and nylon (Figure 14). The result was the basis for the LCA conducted.

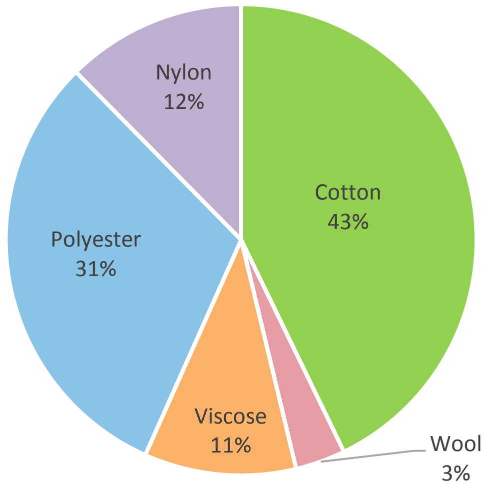


Figure 14 *Final fibre classification for the Swedish textile consumption. Based on accumulated data for the years 2000-2013.*

The environmental impacts of the textile consumption were studied for the years 2000, 2007 and 2013. Based on the result from Figure 14, a specific breakdown of fibres was done for these three years (Figure 15).

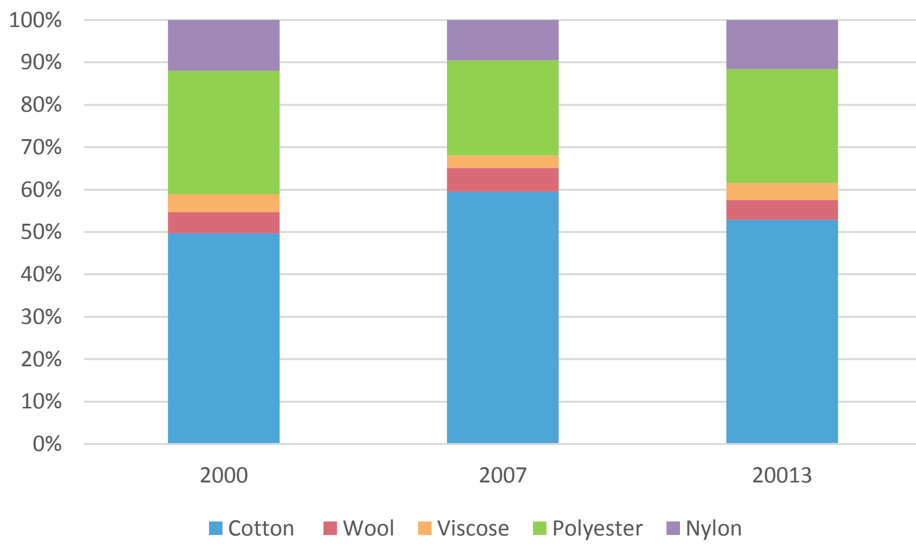


Figure 15 *Fibre distributions for the Swedish textile consumption in 2000, 2007 and 2013.*

The distribution between the years is similar. A higher share of cotton fibres (and lower share of polyester fibre) can be seen in 2007 but there is no substantial change between the years.

6.2 Consumption development for clothing and household textiles

Clothing and household textiles were classified into 25 end products in 5 different fibres (Appendix A). Figure 16 show the development for clothing and household textiles between 2000 and 2013.

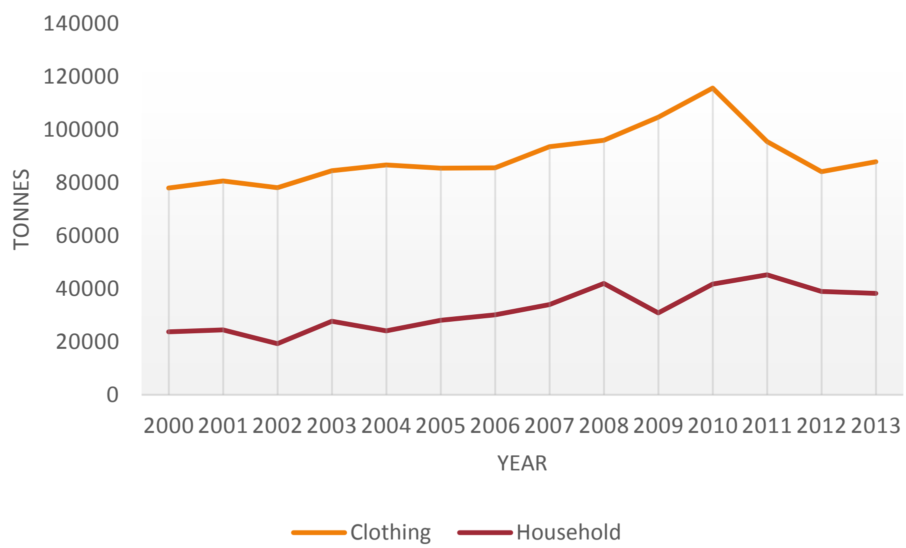


Figure 16 *Clothing and Household consumption in Sweden between the years 2000-2013.*

Between the years 2000-2013 clothing has increased with 15 % and household textiles with 38 %. The overall consumption for these two categories has increased with 21 %.

6.2.1 Product distribution

The 25 different end products of clothing and home textiles are representing the consumption in different proportions (Figure 17). The result is based on an accumulated consumption between the years 2000 – 2013.

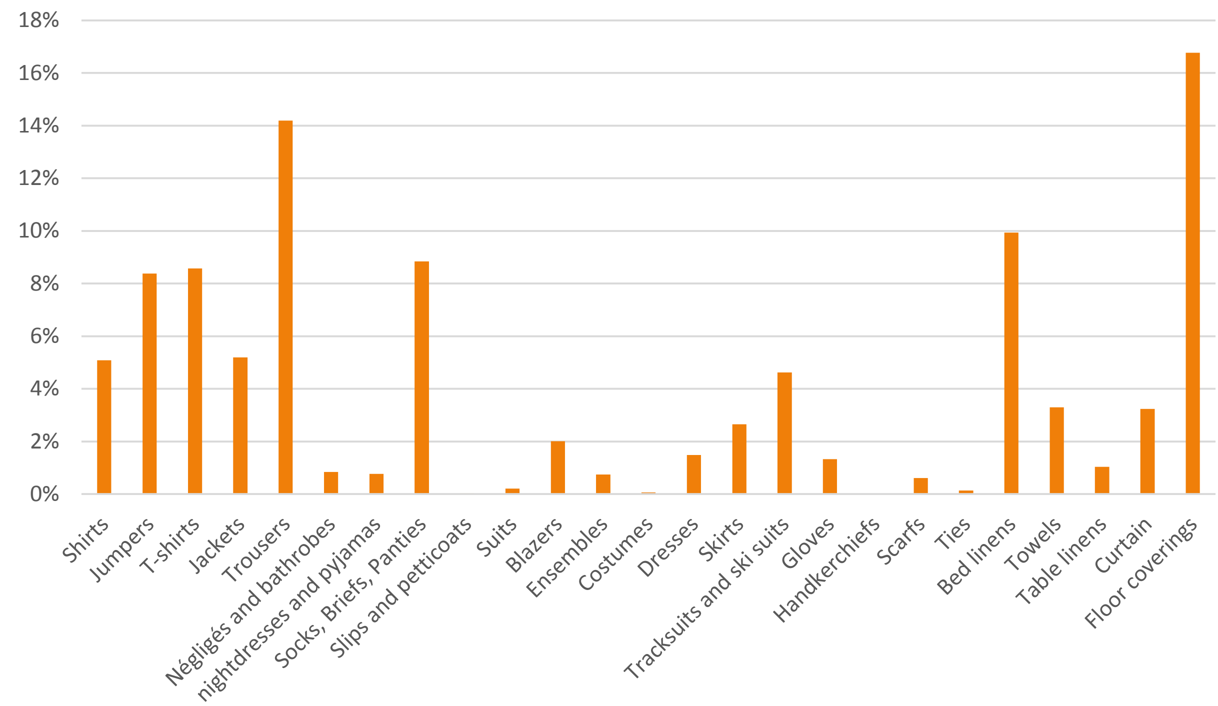


Figure 17 *End product distribution between the years 2000-2013. The result is based on the accumulated consumption.*

The consumption is dominated (> 8%) by floor coverings (17%), trousers (14%), bed linens (10%), socks, briefs and panties (9%), t-shirts (9%) and jumpers (8%).

6.3 Environmental impact assessment

The environmental impact for five fibres and 25 different products were studied for the years 2000, 2007 and 2013 (chapter 4). Input data for the selected years can be found in Appendix A. The result for selected impact categories can be found below and all impact categories are quantified according to the impact assessment method CML 2001.

The life cycle stages includes the production of textile (with raw material extraction), use phase, waste management and transportations between production and use phase (T1) and use phase and waste management (T2).

6.3.1 Acidification

The effects on acidification are expressed as Acidification Potential [kg SO_2-eq/ kg total textile consumption].

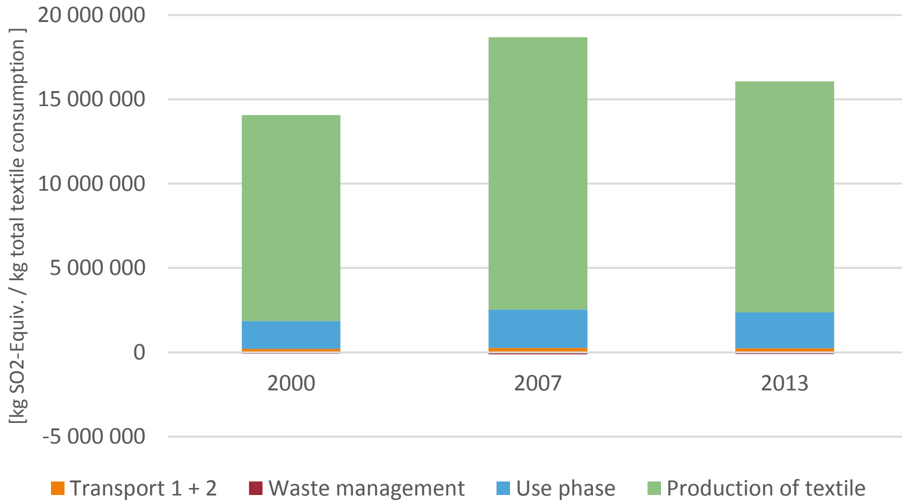


Figure 18 *Acidification Potential for the Swedish textile consumption 2000, 2007 and 2013 [unit: kg SO_2-eq/kg total textile consumption].*

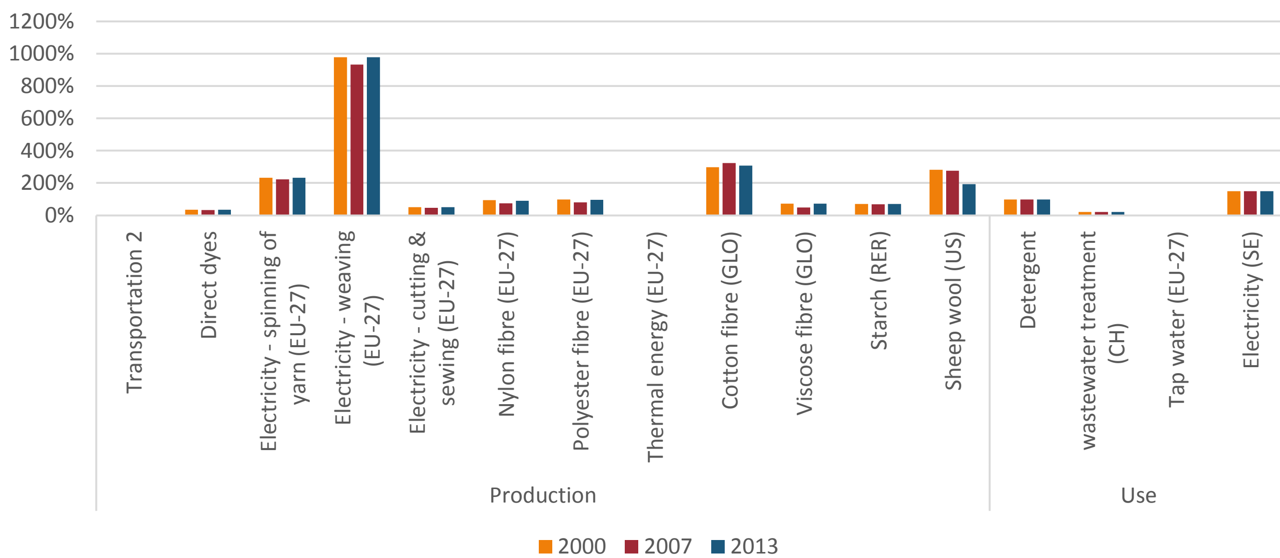


Figure 19 *Contributing processes in production and use phase for AP. Data represents the impacts for 25 end products per kg textile. Maximum is 2500 % and represent 25 textile products and their proportional impact at different stages in life cycle. Each product affects the impact category in different ways and the figure shows the summarized impact for 25 products. Abbreviations: Functional Unit (FU), Acidification Potential (AP), Global (GLO), Europe (RER), Europe union with 27 member countries (EU27), Sweden (SE).*

Production is dominating the levels of the Acidification Potential (Figure 18). Electricity in the weaving process and the natural fibres are the dominating processes in the production (Figure 19). The higher level of AP in 2007 is a result of a larger amount of consumed textile and a possible higher share of cotton fibre.

6.3.2 Eutrophication

The effects on eutrophication are calculated with the Eutrophication Potential [kg PO_4-eq/ kg total textile consumption].

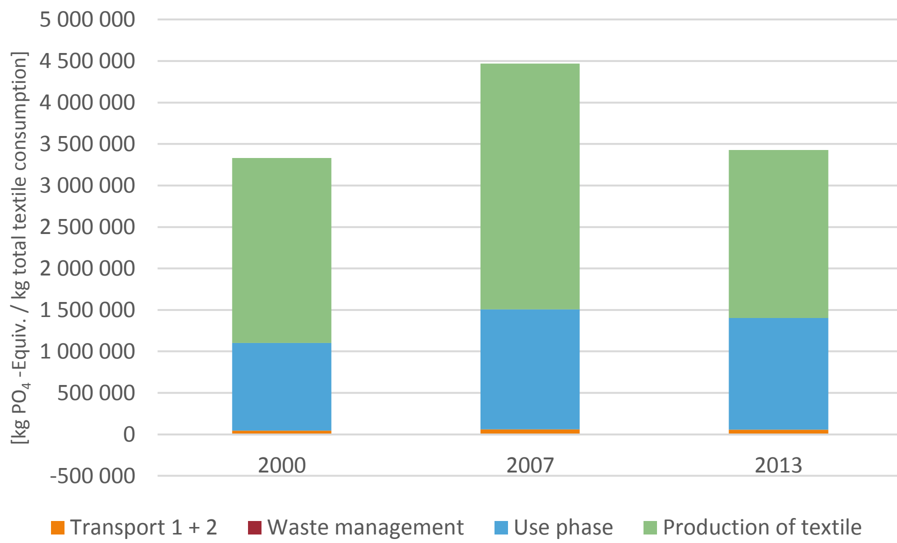


Figure 20 *Annual eutrophication Potential for the Swedish textile consumption 2000, 2007 and 2013 [unit: kg PO_4-eq/kg total textile consumption].*

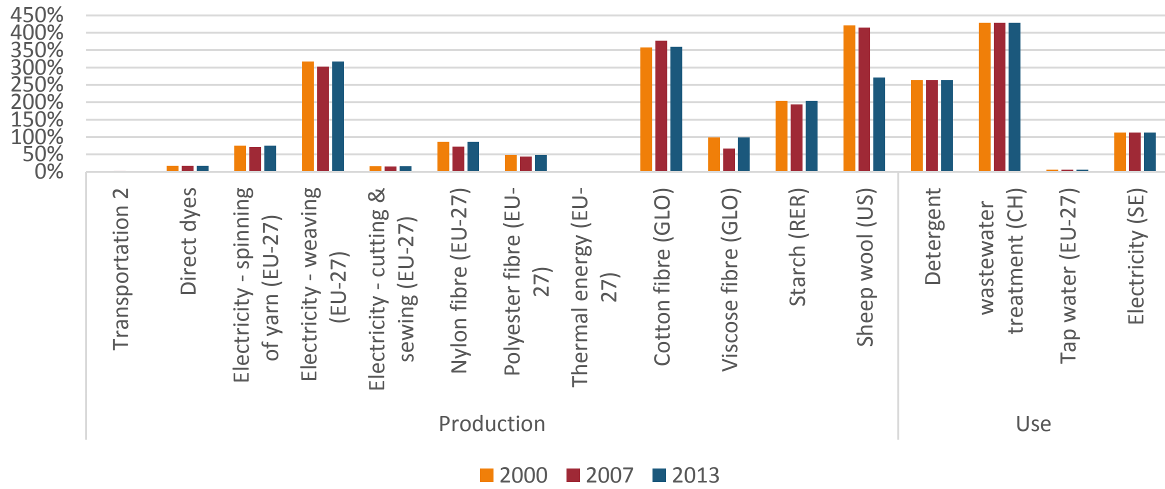


Figure 21 *Contributing processes in production and use phase for EP. Data represents the impacts for 25 end products per kg textile. Maximum is 2500 % and represent 25 textile products and their proportional impact at different stages in life cycle. Each product affects the impact category in different ways and the figure shows the summarized impact for 25 products. Abbreviations: Functional Unit (FU), Eutrophication Potential (EP), Global (GLO), Europe (RER), Europe union with 27 member countries (EU27), Sweden (SE).*

The largest contribution to the Eutrophication Potential is the production phase and the natural raw material fibres (wool and cotton) (Figure 20/21). Electricity in the manufacturing of fabric is also affecting the levels of EP (Figure 21). The use phase contributes to some environmental impact where the sewage treatment and detergent are contributing processes (Figure 20/21). As for the AP, the high level in 2007 is probably an effect of a bigger net consumption and a higher share of natural fibres.

6.3.3 Global warming

The effects on global warming are calculated with the Global Warming Potential with a reference of 100 years [kg CO_2eq/ kg total textile consumption].

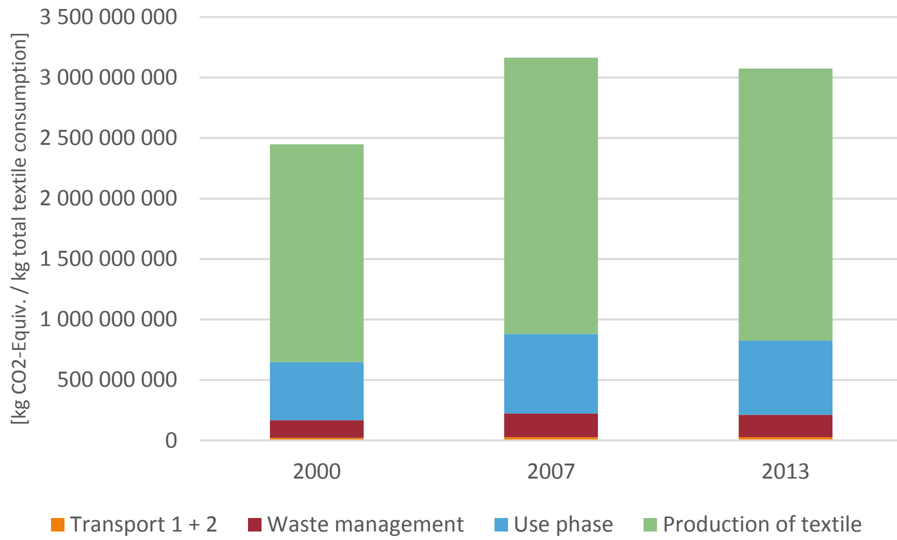


Figure 22 *Global warming Potential for the Swedish textile consumption 2000, 2007 and 2013 [unit: kg CO_2eq/kg total textile consumption].*

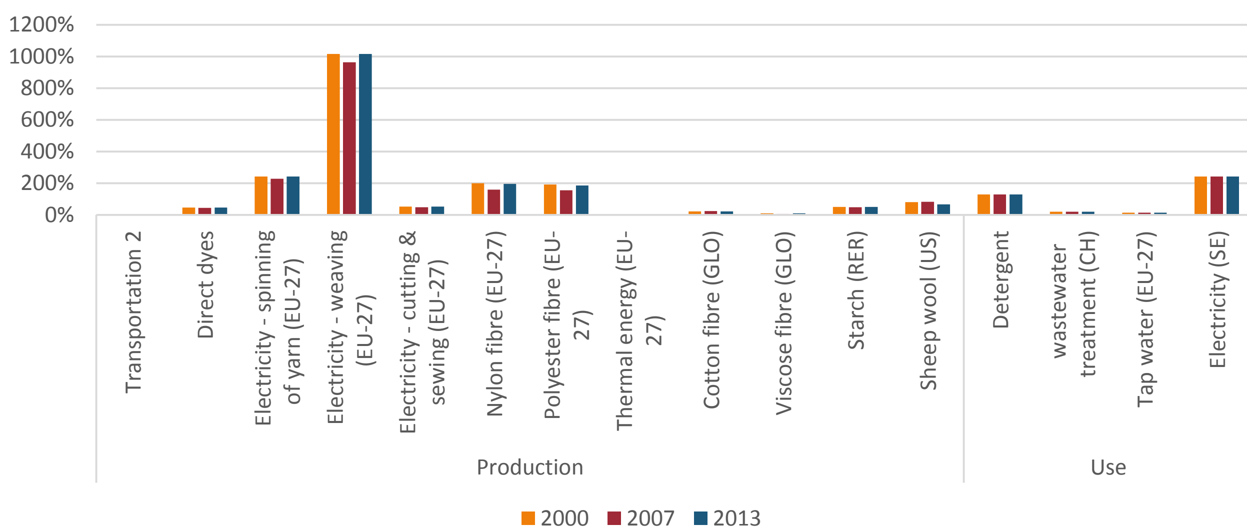


Figure 23 *Contributing processes in production and use phase for GWP. Data represents the impacts for 25 end products per kg textile. Maximum is 2500 % and represent 25 textile products and their proportional impact at different stages in life cycle. Each product affects the impact category in different ways and the figure shows the summarized impact for 25 products. Abbreviations: Functional Unit (FU), Global warming Potential (GWP), Global (GLO), Europe (RER), Europe union with 27 member countries (EU27), Sweden (SE).*

The results show that the production phase is dominating the impacts for the Global Warming Potential (Figure 22). Electricity in the production phase and electricity in the use phase is the most contributing process to the GWP (Figure 23). Raw material production is also contributing to a certain extent.

6.3.4 Human Toxicity Potential

The effects on human toxicity are calculated with the Human Toxicity Potential [kg DCB-eq/ kg total textile consumption].

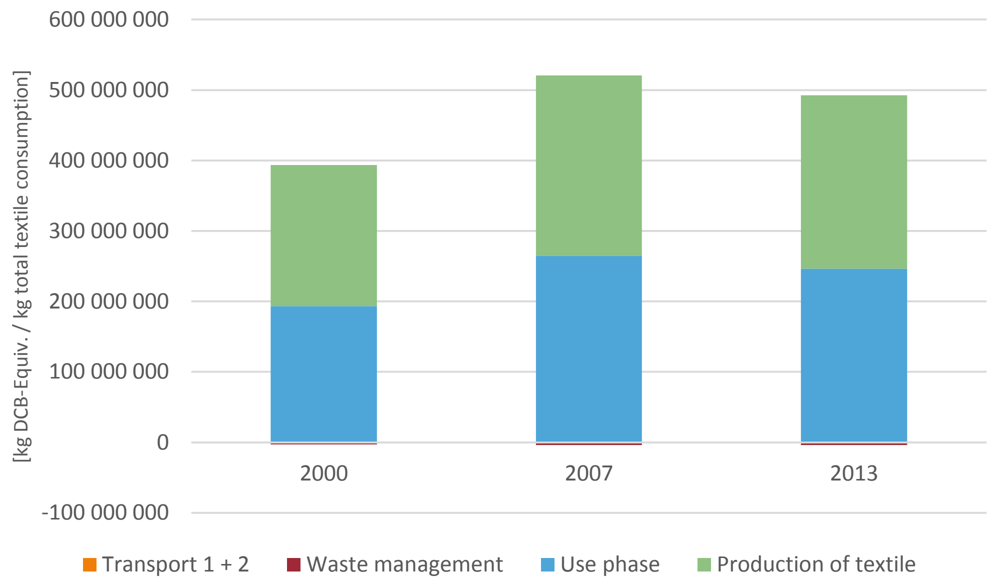


Figure 24 *Human Toxicity Potential for the Swedish textile consumption 2000, 2007 and 2013 [unit: kg DCB-eq/ kg of total textile consumption].*

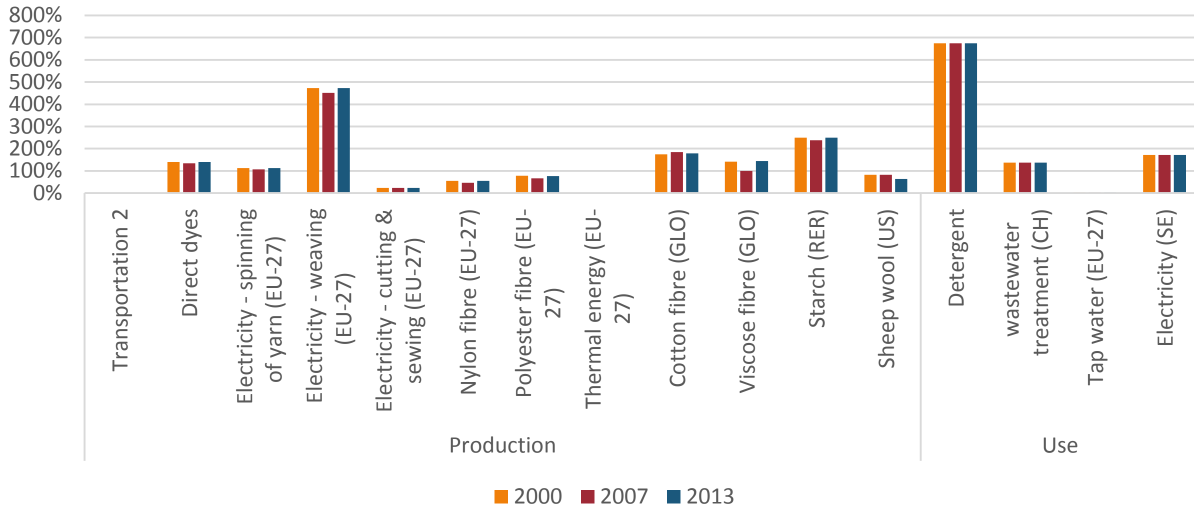


Figure 25 *Contributing processes in production and use phase for HTP. Data represents the impacts for 25 end products per kg textile. Maximum is 2500 % and represent 25 textile products and their proportional impact at different stages in life cycle. Each product affects the impact category in different ways and the figure shows the summarized impact for 25 products. Abbreviations: Functional Unit (FU), Human Toxicity Potential (AP), Global (GLO), Europe (RER), Europe union with 27 member countries (EU27), Sweden (SE).*

The production and use phase have an almost equal share of the amount of Human Toxicity Potential (Figure 24). In Use phase detergent is the dominating process and in production, the electricity use in the manufacturing of fabric affects the outputs (Figure 25).

6.3.5 Terrestrial Ecotoxicity

The effects on Terrestrial Ecotoxicity are calculated with the Terrestrial Ecotoxicity Potential [kg DCB-eq/ kg total textile consumption].

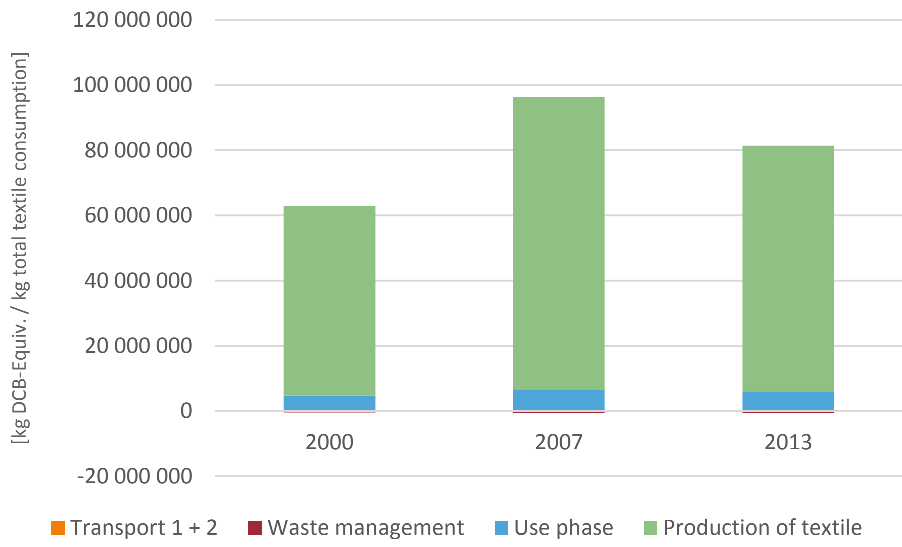


Figure 26 *Terrestrial Ecotoxicity Potential for the Swedish textile consumption 2000, 2007 and 2013 [unit: kg DCB-eq/ kg total textile consumption].*

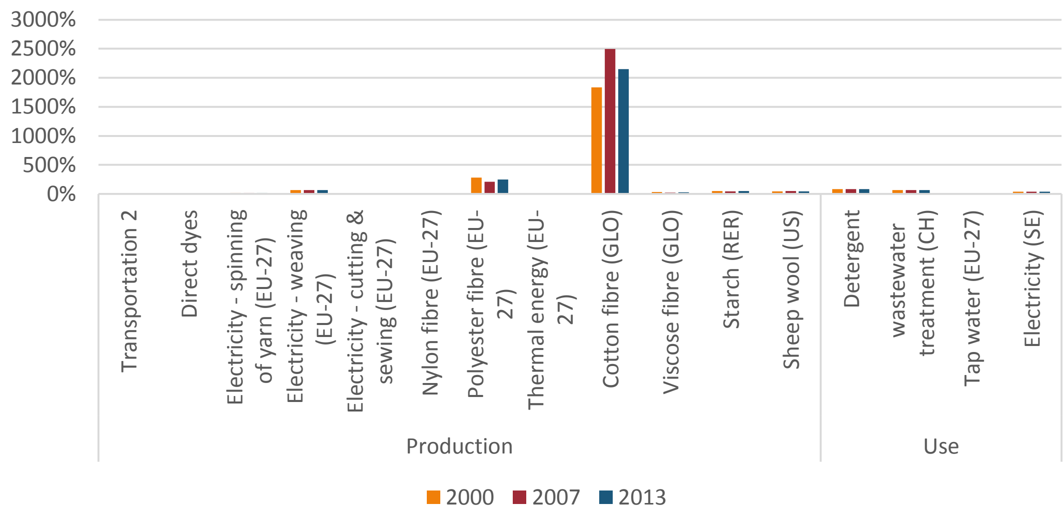


Figure 27 *Contributing processes in production and use phase for TETP. Data represents the impacts for 25 end products per kg textile. Maximum is 2500 % and represent 25 textile products and their proportional impact at different stages in life cycle. Each product affects the impact category in different ways and the figure shows the summarized impact for 25 products. Abbreviations: Functional Unit (FU), Terrestrial Ecotoxicity Potential (TETP), Global (GLO), Europe (RER), Europe union with 27 member countries (EU27), Sweden (SE).*

The Terrestrial Ecotoxicity Potential is dominated by the production phase and raw material extraction of cotton (Figure 26/27). Some impacts also occur in the raw material production of polyester (Figure 27).

6.3.6 Energy demand

The primary energy demand from renewable and non-renewable resources was studied for the production, use phase, waste management and transportations [MJ/ kg total textile consumption].

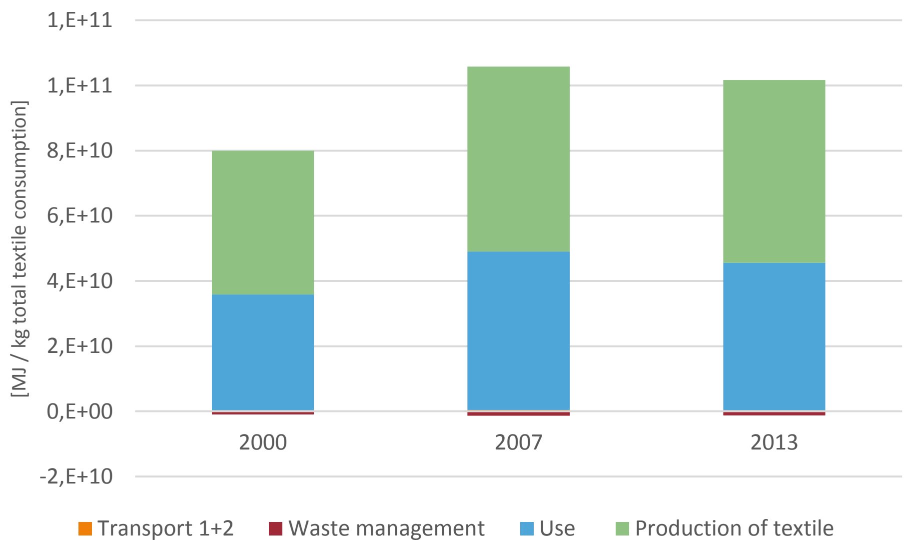


Figure 28 *Primary energy demand for between the years 2000, 2007 and 2013. Unit: [MJ/ kg of total textile consumption]*

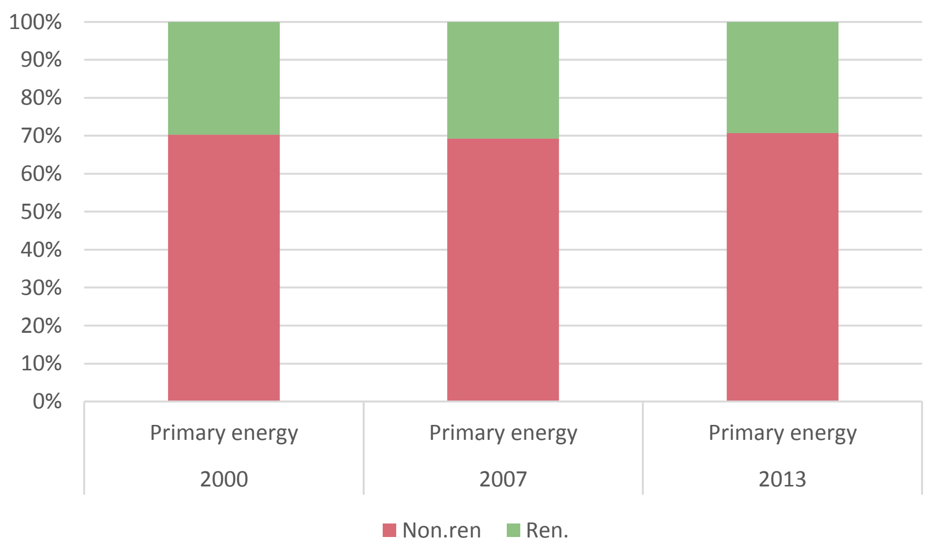


Figure 29 *Primary energy demand for between the years 2000, 2007 and 2013, distributed over non-renewable and renewable sources.*

Figure 28 and 29 show the results for the energy demand. The energy demand is higher in 2007 due to a larger amount of consumed textiles. The energy distribution is dominated by the non-renewable energy sources (2/3).

6.3.7 Water use

The water use and water consumption are studied for production, use, waste management and transportations. The results are presented in [kg].

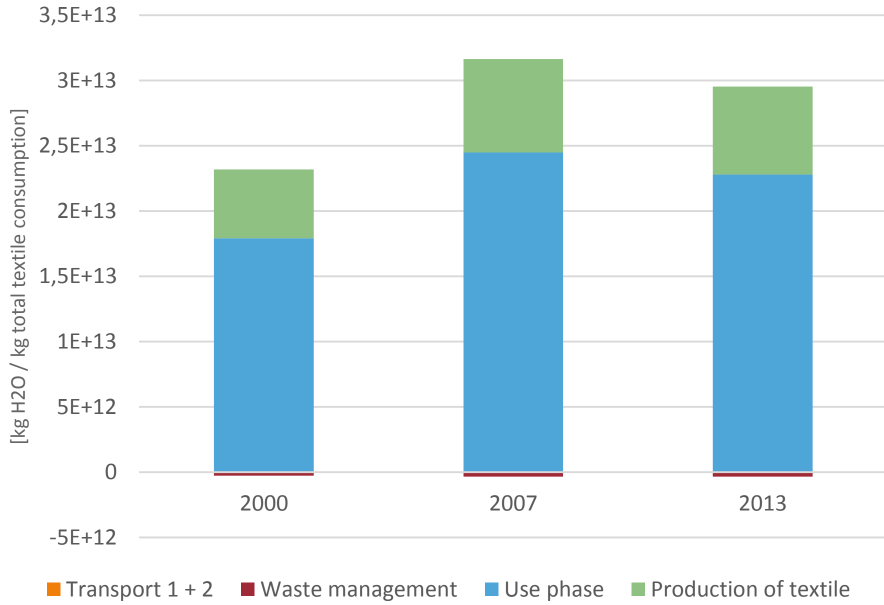


Figure 30 *Total water use for the Swedish textile consumption. Unit: [kg H_2O/ kg of total textile consumption]*.

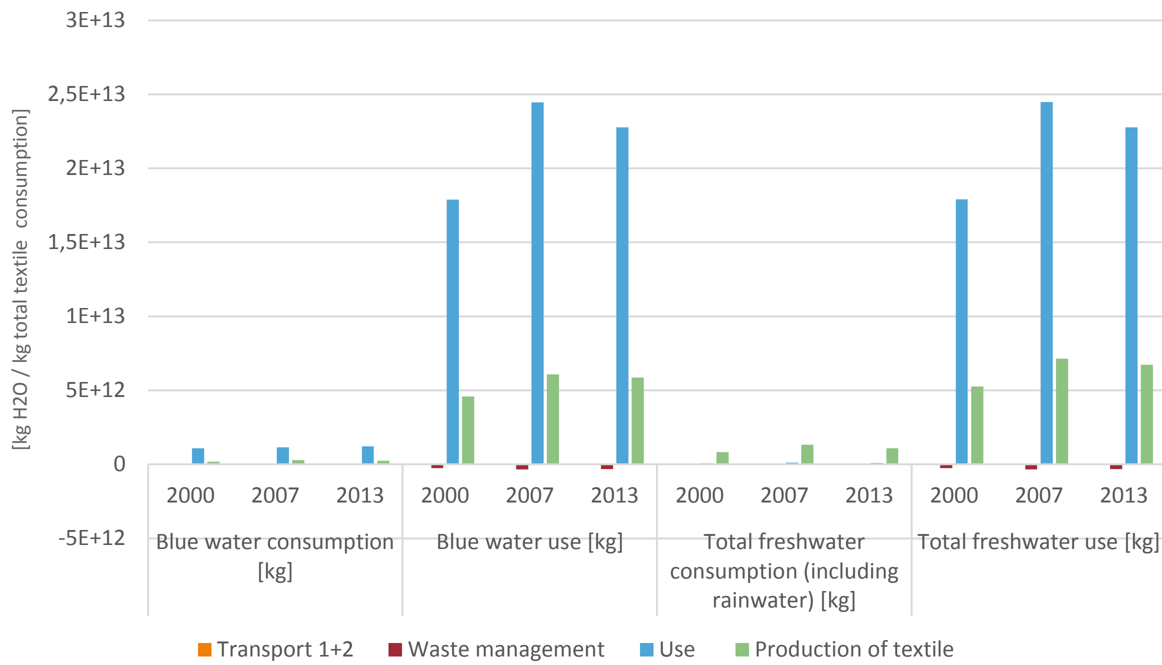


Figure 31 *Blue water use/consumption and Total freshwater use/consumption for different stages in life cycle.*

The water use is dominated by the use phase, regardless of year (Figure 30). The used water is divided into blue water use/consumption (surface and groundwater) and total freshwater use/consumption (surface, rain and groundwater) (Figure 31). The blue water use and total freshwater use are still dominated by the use phase but the production stage is dominating the freshwater consumption (Figure 31). Use phase is dominating the blue water consumption (Figure 31).

6.3.8 Summary of the environmental impacts

Figure 31 show a summary of the environmental impacts AP, EP, GWP, HTP and TETP. The figure shows their percentage distribution between different life cycle stages.

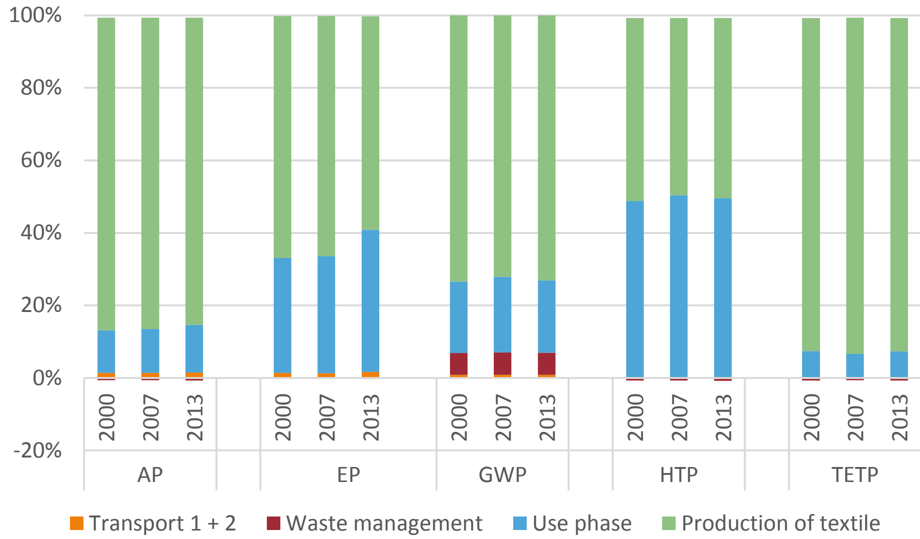


Figure 32 *Environmental impact categories and their percentage distribution in different stages of life cycle.*

To summarise, production is dominating most of the environmental impact categories, but the use phase has a substantial impact in certain categories, especially HTP and TETP (Figure 32). Waste management and transportations does not affect the impacts as much.

7. UNCERTAINTY ANALYSIS

7.1 Dominance analysis

A Dominance analysis was made in order to determine which stages and processes in the life cycle that affects the final result the most. In general, the production and use phase have significant effects on the system and in the production, electricity in manufacturing of fabric and the natural fibres are the most contributing processes. In the use phase it is mainly the electricity that contribute and to some extent the washing detergent.

7.2 Sensitivity analysis

In order to analyse contributing processes, a sensitivity analysis was performed to evaluate the dominating processes in the life cycle. The dominance analysis resulted in production and use phase as the most contributing processes in this life cycle. For simplification, the sensitivity analysis was only performed for the year 2007. The other years (2000 and 2013) were assumed to follow the same pattern as 2007. This assumption could be made since all processes between the years are the same, but input data of amount of consumed end products and the fibre distribution differed. Since the fibre distribution was so similar the effects should be equal.

The water use was not included in the sensitivity analysis due to difficulties in analysing the outcome. For further explanation, see section 8.

The following sensitivity analyses (S) were made:

- **S1: Electricity in manufacturing of fabrics**. Since the electricity played an important role in several impact categories a sensitivity analysis was made for the electricity use. The process manufacturing of fabrics had a big influence on the electricity use and the data contained some uncertainty. The default energy use was 48.8 MJ electricity and 0.01 MJ steam. For S1, it was assumed that the energy consumption was decreased by 25%, which equals 36.6 MJ electricity and 0.0075 MJ steam.

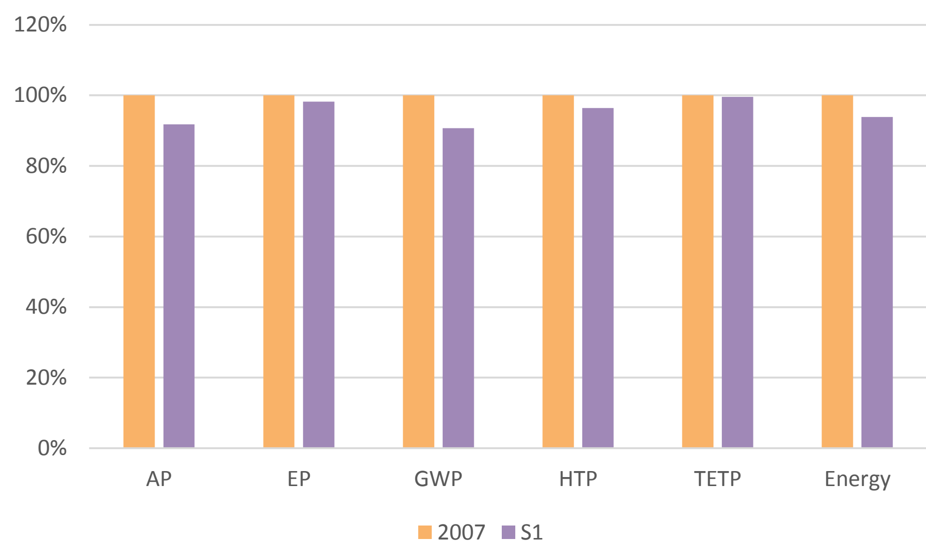


Figure 33 *Sensitivity analysis of manufacturing of fabric. S1 represents a 25 % decrease of energy consumption in manufacturing phase. Abbreviations: AP (Acidification Potential), EP (Eutrophication Potential), GWP (Global warming Potential), HTP (Human Toxicity Potential), TETP (Terrestrial Ecotoxicity Potential), Energy (non-renewable and renewable).*

Table 8 Percentage change with S1 (based on absolute values)

AP	EP	GWP	HTP	TETP	Energy	Average
-8%	-2%	- 9%	-4%	0%	-6%	-5%

The effects of the environmental impacts have generally decreased (Figure 33, Table 8). AP and GWP are most sensitive to electricity use in the manufacturing of fabric (Figure 19 and 23) and the result of S1 indicates the same. TETP is barely affected by the electricity use in the manufacturing of fabric (Figure 27) which explains why no change of TETP can be seen for S1.

- **S2: No natural fibres.** The raw material production of natural fibres affected some environmental impacts to a great extent. In order to follow how great that impact actually is, no natural fibres were assumed. Polyester, nylon and viscose were the only fibres included in the net consumption of 2007.

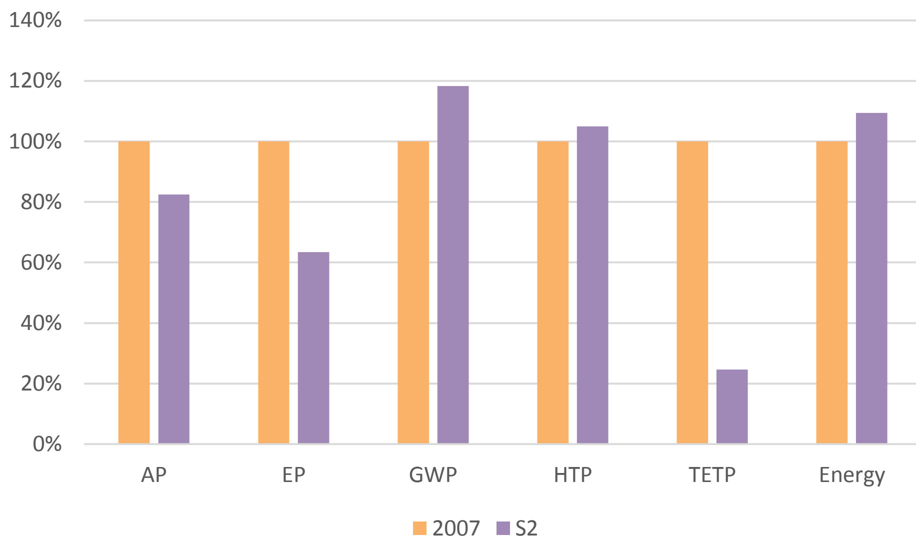


Figure 34 *Sensitivity analysis of the fibre consumption. S2 represents a textile consumption with no consumption of natural fibres (cotton and wool). Abbreviations: AP (Acidification Potential), EP (Eutrophication Potential), GWP (Global warming Potential), HTP (Human Toxicity Potential), TETP (Terrestrial Ecotoxicity Potential), Energy (non-renewable and renewable).*

Table 9 Percentage change with S2 (based on absolute values)

AP	EP	GWP	HTP	TETP	Energy	Average
-18%	-37%	+18%	+5%	-75%	+9%	-16%

A textile consumption with no natural fibres results in a decrease of the overall environmental impacts except Energy and GWP (Figure 34, Table 9). The TETP decreases drastically and is probably the result of the large amount of pesticides that the natural fibres, especially cotton production, contribute with (Figure 27). EP also decreases and this was expected since the natural fibres are contributing to the levels of EP (Figure 21). Consumption with no natural fibres increases the energy demand, which confirms that synthetic fibres demand more energy. The increase in GWP may be the result of that man-made fibres, especially polyester and nylon, are extracted from fossil fuels. AP is to some extent affected by the natural fibres and that explains the decrease of AP (Figure 19).

- **S3: No tumble drying.** Since consumers can affect some of the environmental impacts it was interesting to see how no tumble drying of textiles would affect the final result. The textiles were assumed to be air-dried.

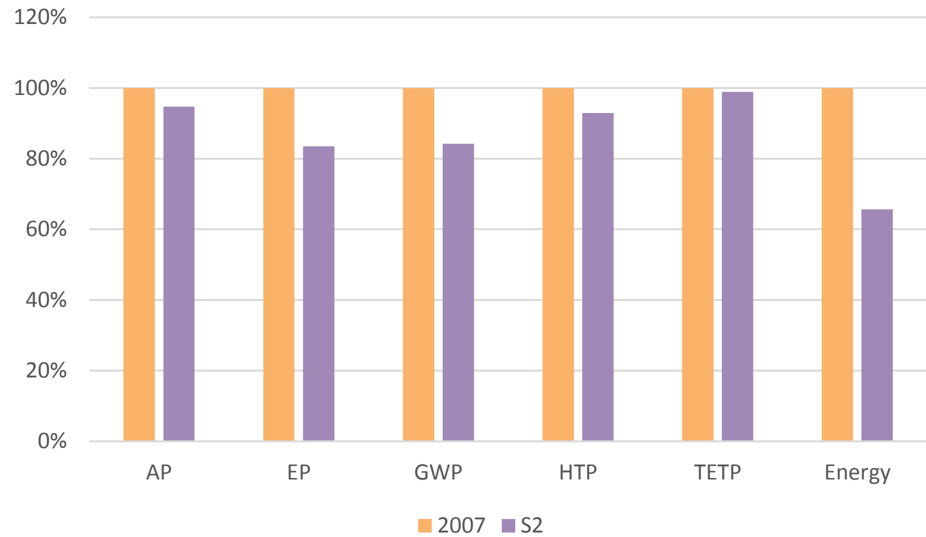


Figure 35 *Sensitivity analysis of the use phase. S3 represents an assumption of no tumble drying. Abbreviations: AP (Acidification Potential), EP (Eutrophication Potential), GWP (Global warming Potential), HTP (Human Toxicity Potential), TETP (Terrestrial Ecotoxicity Potential), Energy (non-renewable and renewable).*

Table 10 Percentage change with S3 (based on absolute values)

AP	EP	GWP	HTP	TETP	Energy	Average
-5%	-17%	-16%	-7%	-1%	-34%	-13%

If consumers would stop tumble drying their textiles completely, the energy use would decrease with approximately 1/3 and the overall environmental impacts would decrease as well (Figure 35, Table 10). EP and GWP are both affected by the energy consumption in the use phase but it is not the dominating process (Figure 21 and 23). Less tumble drying also increases the life times since the textiles are exposed to less friction.

8. DISCUSSION

This section includes a discussion on LCA in general, the statistics and the Life Cycle Assessment.

8.1 METHODOLOGY

To identify the environmental impacts, the consumption model was based on a life cycle assessment. The weakness in this approach lies in the dependency on available data and that can be crucial for the end result. Even though international standards are developed to standardise the methods of life cycle assessments, different approaches and delimitations can affect the outcome. Objectivity is important to maintain credibility, but it is not sure that it can be implemented all the time. The statistics and the LCA are supposed to be able to be reproducible and if subjective choices are included this may affect the reproducibility.

As mentioned in the Introduction, other methods for identifying the environmental impact of consumption are available. Input-output analysis (IOA) is an economic method that describes monetary inputs to produce one product. The IOA can be expanded to environmental IOA and considers the emission outputs that a product creates and correlates it to e.g. 1 million SEK (SEPA, 2011). The environmentally extended IOA is a good technique to identify consumption and production patterns, but is probably not the best way to identify environmental impacts. The model often ends “cradle to gate”. Use phase and waste management is not included in the IOA, so great environmental impacts may be ignored or missed. The IOA generally only includes environmental data for greenhouse gases and emissions to the atmosphere while other impact categories are not studied.

Carbon, water and ecological footprints are other available techniques to study consumption (SEPA, 2011). A footprint highlights different environmental impacts and is related to e.g. water use or other important resources. Footprint modelling methods are detailed and probably illustrate a better picture of the consumption. On the other hand footprint models are generally too narrow and biased, and exclude other impact categories (SEPA, 2011).

In the end a life cycle assessment is useful. The benefit lies in the general results and LCA covers several environmental impact categories, though only five are presented in this report. This study was conducted under time limited circumstances which unfortunately resulted in a limited number of studied environmental impacts. Other impacts worth including would have been e.g. ozone layer depletion and photochemical oxidation. Nevertheless, this model provides information about dominating processes and further development that can be done in order to reduce the environmental impacts.

8.2 THE STATISTICS

The statistics from Statistics Sweden have some major issues worth discussing. First of all, some CN-categories were really detailed while others were not. This resulted in an uneven distribution of textiles and in a skewed consumption model e.g. long trousers, shorts and knickers were all included in the same CN-category of “Trousers” while “Accessories” were really detailed. The same issue happened to the fibre distribution. Some CN-categories are really detailed while other only consisted of e.g. “man-made fibre” and that made it difficult to allocate fibres to the correct categories.

According to the Swedish Customs[4] this uneven levels of details have to do with the classification from the European Commission. Statistics Sweden (and the Swedish Customs) cannot influence the CN categorization and they are not allowed to deviate from it either. The categorization is used for the companies to pay the right tax/VAT and is not suited for identifying product flows. The Swedish Customs also says that the classification sometimes is an issue for the Trade Organizations since some industries want a specific breakdown for better statistics.
Objectivity has been attempted as far as possible when categorizing different CN-groups, but some decisions may have been exposed to subjective selection. The intention is that this categorization can be repeated but since the level of details differed, it cannot be guaranteed.

Regarding the domestic production in Sweden, a lot of data was classified, which resulted in uncertainties. Some years included more classified data than others and that may have an effect on the data for the net consumption. The data was also delivered in other units, which may have generated an additional uncertainty when converting the data. Some data was given in square meters and no consideration was taken to density, only weight, when converting the data to tonnes. This incorrect assumption was only applied on floor coverings but it was impossible to investigate each floor cover separately within the given time frame. On the other hand, Swedish import and export of textiles occur in a much greater extent than domestic production, so the uncertainty of the domestic production (ICP) should not affect the final results to any large extent.

One concern worth highlighting is the large share of unspecified textiles (30%). What are their end products? Who is producing it? Since that proportion is unspecified and rather would it be interesting to investigate that missing piece further. Swedish Textile and Clothing Industries Association, TEKO, has no information about possible suppliers but it is clear that this affects the final result since the net consumption studied here is underestimated (30 % unspecified textiles and 2 % of other textile end products were excluded from the LCA).

The Swedish net consumption has many similarities with the overall EU27-consumption. The Swedish fibre distribution is similar to the fibre distribution in the reference report from the Joint

[4] Personal communication (2015-03-19)

Research Centre (JRC) (Beton. A et al, 2014). The same similarity exists with the overall textile consumption; clothing and household textiles are dominating.

No significant trend for the total net consumption between the years 2000-2013 was observed (Figure 9). A general assumption would suggest an increase in the textile consumption but, the great fluctuations and the variations in detailed data may hide the true results. However, there is a 21 % increase for clothing and household textiles (Figure 16). One Swedish report (Carlson et.al, 2011) states a 40 % increase between the years 2000-2009 but that study only included import and export (Carlsson. A et al, 2011). Even though domestic production is not the determining factor, it may affect this result. A further study would be to investigate how the domestic textile production has developed, but it is most likely decreasing in Sweden. The difference can also be due to the choice of CN-categories but the main result is at least that clothing and household has increased during the studied time period.

8.3 Life Cycle Assessment

The LCA ISO standard 14040 has been implemented as far as possible but it is difficult to fully predict the applicability in the model since external factors affect the result.

First, a constant technical and temporal capacity was assumed during the entire time span. This is problematic since techniques evolve all the time. It is most likely that e.g. energy performance has been improved between 2000 and 2013. One substantial temporal change is the detergent. In 2008, a prohibition on phosphates in detergents was established in Sweden (Uddin. T, 2008). This was one step in reducing the emissions of phosphorus to the Baltic Sea, but the detergent used in the model does not include phosphorus. The phosphorus is instead replaced by zeolite and this probably leads to an underestimation of the Eutrophication Potential before 2008 and does not show any environmental changes between e.g. 2000 and 2013. In general, the only thing that differs between the years was the fibre distribution and the net consumption.

In real life, clothing and household textiles would be stored under several years. This model assumes that all textile products are being used and disposed during the same year they are consumed and that probably results in an accumulated yearly impact on the environmental consequences. The use phase is often spread over a longer time span which distributes the environmental impacts over several years.
The assumption was done for simplified reasons and due to lack of data about storing.

This study focused on end products and excluded disposables and products partly containing textiles. While doing so, environmental impacts of the textile consumption is underestimated. Although disposables do not have a use phase with regard to washing etc., the production of the disposables matter in the bigger picture. The disposables should be included in the model if a complete model of the textile consumption is analysed.

8.3.1 Life cycle inventory

Due to large data gaps in the model, simplifications and assumptions have been made.
One major impact that was not taken into consideration was the characteristics of the fibres. Quality, such as thickness, length, strength, formability, gloss or ability to insulate heat is crucial to the end result but has not been taken into consideration. All products were assumed to consist of 100 % cotton, wool, viscose, polyester or nylon. Mixed materials may have another impact on the final result but this has been excluded.

Production

The manufacturing process has a lot of known and probably unknown data gaps. In order to complete the model, many simplifications were needed. Since 25 different end products were studied, it was difficult to go into detail about every product. For example, all products were assumed to be produced with the same yarn quality (decitex). A lower decitex requires more energy and it is not established what the most common decitex is since it differs between products. On the other hand, the electricity consumption did not differ that much between different spinning techniques so that is probably not critical for the end results. Due to limitations and absence of data the yarn did not undergo any washing, drying, further dyeing etc. and this may have underestimated the environmental impacts.

The same consequences should be applied in the manufacturing of fabric. Several attempts were made to gain more knowledge about the manufacturing process, but with 25 different end products this was difficult.

The assumptions on material losses in the manufacturing stage were very general. They were often based on specific end products and may probably differ between products. Towels, for example, probably have a lower material loss than a dress since fewer details are needed to be sewed or cut. In fact, all the material losses in the production were very general.

Use phase

Consumers have a great influence over the environmental impacts. First of all, the consumption is an issue alone. Even if clothing and household textiles are produced with high quality and long life time, fast changing fashion is the major problem. Textiles are probably not tossed away because they are ragged and it would be interesting to know the reasons why textiles actually are disposed.
The use phase only included washing and drying and did not take ironing, softener or dry cleaning into consideration. This assumption may underestimate the environmental impacts of the use phase since those activities actually occur to some extent. On the other hand, ironing, softener or dry cleaning is not crucial for the textiles to be further used and not all end products follow such treatment.

In order to have something to compare with, the life times of textiles were mainly based on the report from JRC (Beton. A et al, 2014). The JRC report assumed no washing for floor coverings, but since some floor coverings actually are being washed regularly, washing of floor coverings was assumed in this report, though maybe a bit underestimated. The assumed life times are only indications and one should be aware of the uncertainties it entails.

The temperature of the washing was set to 60 degrees Celsius. This is relatively high and probably not the most common setting in Sweden. The high temperature was chosen since reports with washing machines were tested at that temperature. A lower setting would most certainly result in lower energy consumption, but the difference is probably not that big since it was the energy in the tumble drying that was the dominating process. The tumble drying contributed most to the electricity consumption in the use phase and it is probably more important to develop more energy efficient tumble dryers than to decrease the washing temperature from 60 to 40 degrees Celsius. This is only an assumption and further studies must be done to confirm that.

The data for the detergent in this model was rather simplified due to lack of data. It may be important to analyse the importance of the detergent further. Is there for example, any difference between powder- and fluid detergents?

Finally, the washing machines and tumble dryers were assumed to be used with its maximum capacity (6-7-kg). Swedes normally wash a load of 2.5 kg and the assumption was made that the machines did not adjust to the actual washing load (SEA, 2009a). Modern technology probably adjusts the energy and water consumption to its load. If so, lower water and energy consumption can decrease the environmental impacts. To draw a final conclusion on the effects of capacity load, more studies must be done.

Waste management

The default for textile disposal was incineration and landfill, but in order to reduce the environmental impacts of the production, an increased reuse and recycling are both necessary and crucial. Recycling was not considered in this model, but since the Swedish Environmental Protection Agency (SEPA) has a goal to increase both reuse and recycling, it would have been interesting to include that. The estimated life times in this report include secondary use but it does not mean that reuse opportunities are available.

As mentioned earlier, reuse of textiles in Sweden is approximately 20 % today, but if the milestone of SEPA shall be fulfilled, the reuse must increase to 40 % by 2018. Recycling has to be improved drastically the following years, from about 0 % to 25 % in 2020. Recycling and reuse would hopefully decrease new products put to on the market as well as a better handling with recourses. If more textiles were recycled the environmental impacts from the raw material production would hopefully decrease drastically.

Transportations

The assumptions on transportations in this model are very general, and does not take each unique product into consideration, and the distance may be underestimated since air freight is not included. The transportations in the results include only the big major transportations between production and use phase, and use phase and waste management. Other transportations occur in the life cycle but only two major transportations were included (section 5.8). However, transportations are not the major contributing processes, but it may be relevant to distinguish more types of transportations in order to develop the model further.

8.4 Overall Environmental impacts

The overall environmental impacts occur in the production of textiles. The electricity use in the manufacturing of fabric and use phase has a great impact, but the raw material extraction of natural fibres is also contributing.

Since no consideration was taken to geographical boundaries, the choice of impact categories is very general and it is difficult to actually know where the impacts are the greatest. In general, the impacts follow similar results like the reference reports from Palm. D (2013) and JRC (2014). The effects from transportations differ a little and this report may have underestimated the distances between different stages in the life cycle. Seaborne freight was the major transportation vehicle between continents since the Report from JRC stated that this was the most common way to freight textiles (Beton. A et al, 2014). Air freight should maybe be included if the model is to be improved in the future.

In addition, the use phase did not include any storage of textiles which resulted in an aggregated environmental impact. Normally the use phase is spread over several years but it was too complex to make dynamic effects in the model.

AP is mainly affected by the electricity use in the manufacturing stage and the raw material production of the natural fibres. EP is affected both by the production and use phase and has an even distribution in different processes. The electricity use in manufacturing of fabric and use phase has a great impact on the EP. The washing detergent has some impact on the EP but was not tested in the sensitivity analysis. Another detergent use would probably lead to increased environmental impacts because the used detergent was very general and contained only the major ingredients.

GWP is a global impact but the other impacts are often local or regional why origin is important to know. GWP is mainly caused by the electricity use in both production and use phase. The electricity in the production is dominated by non-renewable resources. The synthetic fibres also have an impact on the GWP and this may be the result of that synthetic fibres are derived from fossil oil.

The TETP is dominated by the cotton production and that may be caused by the large amount of pesticides used on the cotton fields. The sensitivity analysis showed that consumption with no natural fibres decreased the TETP levels drastically. The electricity use did on the other hand increase, which may confirm that synthetic fibres are more energy demanding. TETP and HTP are both sensitive to the washing detergent, but no sensitivity analyses were made for them. The data used for the washing detergent was very simplified because no other data was available. Better data would probably contain more substances and probably increase the impact of TETP and HTP.

The HTP is also sensitive to the outputs from the sewage treatment plant. In the default model a medium-sized wastewater treatment plant was used. The output is calculated as the amount of polluted load per capita per 24 hours. A smaller or bigger treatment plant would probably increase or decrease the HTP respectively, since it is dependent on the size of the population.

The TETP and HTP may be underestimated since characterisation factors for TETP and HTP are missing for many substances and that may limit the assessment of toxicity. In addition, the dyeing processes in the production are limited. It is well known that the dying process in the textiles industries contains hazardous substances but the model did not focus on the production phase so some dyeing processes may have been excluded in the model.

Finally, it is surprising how little the effect of energy recovery in the waste management has on the total result. If the model is correct, this would validate that an increase in reuse and recycling is more important than incineration and landfill. Major environmental benefits can be gained if other disposal methods are developed. For example less raw material extraction would be needed and an increased reuse would maybe result in a decreasing consumption.

In order to get more accurate results the amount and type of end products should be weighed against each other. The default in the current model calculate the environmental impact of one kg textile product, regardless of dominance. Figure 17 shows that some products are more present than others. Floor coverings, trousers, bed linens, socks, briefs and panties, t-shirts and jumpers are the dominating products of the Swedish textile consumption and those products should be valued higher. For example; The consumption of T-shirts should be valued higher than the consumption of ties since the consumption of T-shirts is much greater than the ties (Figure 17). The model did not make any distinction between different end products but this should probably be considered if further analyses are done.

8.4.1 Energy demand

The energy demand shows the energy consumption in different stages and which sources, non-renewable or renewable, that is used the most. Even though the Swedish electricity mix is cleaner than other mixes the non-renewable resources are dominating. This shows that even if the use phase plays a rather big part in the textile consumption it still does not outweigh the non-renewable resources.

8.4.2 Water use

The water use and consumption are complex subjects and it is not easy to analyse the water use as a part of something bigger. Normally, studies are done solely on the water footprint since the impacts of the water withdrawn are affected by origin and season. There is a big difference if the water is taken from Sweden, a country with good water conditions, or if the water is taken from a country with limited water resources. Time of year does also affect the impacts. If the water is taken e.g. March, when the water levels are high, does not have the same impact as if the water is taken in e.g. August when the dry season peaks.

The result only shows the amount of water used and consumed, but not its environmental consequences. It was considered unnecessary to include the water use in the sensitivity analysis since the result did not improve with a deeper analysis. Origin of the textiles was not included in this model, which made water use difficult to analyse. In order to really study the water and its consequences, it is recommended to do a separate water footprint analysis.

8.5 UNCERTAINTY ANALYSIS

The sensitivity analysis confirms that the production and the use phase are the dominating stages in the life cycle of textiles. A decreased electricity use in the manufacturing of fabric, no tumble drying and a smaller consumption of natural fibres, would reduce the environmental impacts. However, more sensitivity analysis should be done in order to study more potential uncertainties, for example another detergent. Other freight alternatives should perhaps also be analysed, though it is doubtful if transportations has that big impact.

Consumption with only man-made fibres decreased the TETP drastically but the GWP and energy use increased, mainly because of the synthetic fibres of polyester and nylon.

It would be interesting to analyse how consumption with only viscose fibre would affect the environmental impacts. Viscose is derived from nature but cellulose is chemically converted viscose and the viscose fibre probably has less impact on the environment than the other two man–made fibres. Further studies should be done to draw conclusions about the impacts and benefits from viscose fibre.

A use phase with no tumble drying should actually increase the life time of the textiles and an increased life time would normally decrease consumption, since fewer textiles are needed. This was not taken into consideration in the sensitivity analysis (S3) but should maybe be included if it is investigated further.

9. CONCLUSIONS AND FURTHER WORK

Even if other methods are available to predict environmental effects of consumption, LCA is to prefer if a detailed and accurate result is not required. Despite some incomplete processes, the LCA model is considered useful to analyse the environmental impacts that the Swedish textile consumption entails. Additionally, the model is applicable for 25 different textile products which makes the model useful in many different areas. The statistics about the net consumption may be an issue but it is nothing the common man can influence. In general, production of different textiles and usage contributes most to the environmental effects. The consumers have a great influence on the environmental effects. With less consumption and no tumble drying in the use phase, great environmental benefits can be achieved. Technical improvements can increase energy efficiency and create opportunities for recycling. By also taking the origin of textiles into consideration, the model can be developed even further.

Apart from conscious choices, an increase in the reuse and recycling is necessary to restrain consumption of new textiles and to decrease the environmental impacts in the production phase. According to the goals of SEP the reuse and recycling will increase drastically. The reuse goal of 40 % is probably achievable by 2018 but a 25 % increase of recycling is doubtful.

Consumption is highlighted to reach Swedish environmental quality objectives. Even if the Swedish textile consumption is not affecting the 16 environmental quality objectives to a very large extent, some objectives are affected. The 16 environmental quality objectives were established in the late 1990´s and were supposed to be accomplished by the year 2020. In many of the recent follow-up activities it has been noted that we are far away from meeting these goals, except for one or two. This is mainly because necessary mitigation measures, as have been identified during recent years, have not been carried out to the extent that the Swedish government has tried to implement. Another reason is the fact that the work carried out in the private business sector has not been considered fully. In this context, this study has its special benefits. Such a detailed LCA study for a selected product category – in this case textile consumption – will bring a most valuable input in all our aspirations to improve our insights on how the business sector in general contributes to the overall environmental impact today. At the same time it shows how specific segments of industrial activities can give quantified input on their part of the overall environmental impact.

The environmental impact from the Swedish textile consumption still takes another step by describing how it affects the environment with regard to different impact categories. The way the Swedish government has formulated the different aspirations for the future environmental situations has left many doubts on how to link environmental burdens to the separate environmental goals. This study has specifically identified which of the separate environmental quality goals the textile consumption can influence by reducing its part of the so-called “environmental stressors”. The studied environmental impacts of Acidification Potential (AP), Eutrophication Potential (EP), Global Warming Potential (GWP), Human Toxicity Potential

(HTP) and Terrestrial Ecotoxicity Potential (TETP) will affect the following environmental quality goals (without priority) (click to follow link, Environmental Objectives (2015)):

- Reduced Climate Impact
- Clean Air
- Natural Acidification Only
- Zero Eutrophication
- A Non-Toxic Environment

9.1 Further work

Though this model is fairly comprehensive, further work can be done to improve it:

- The unspecified part of undefined textiles (30%) should be identified to really know what environmental impact the Swedish textile consumption entails. Who consumes 1/3 of unspecified textiles for input goods? What will their end products be?
- The production phase can be developed further by allowing different spinning techniques and including both woven and knitted textiles. It is a rather big simplification to assume that all textiles are woven, so an inclusion of knitted textile may make the model more realistic.
- The washing detergent did contribute to some environmental impacts and in order to confirm its impacts, more research is needed.
- Include ironing, softeners and dry cleaning in the use phase.
- Include recycling and get more realistic and scientific data on its impact.
- Use time as a factor and take geographical location of activities into consideration.

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10.1 PERSONAL COMMUNICATION

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Appendix A – The statistics

This section presents some of the important background data for the statistics, e.g. a detailed development of the CN-categories and detailed statistics for 2000, 2007 and 2013 that was later used in the GaBi model.

A.1 Development of CN-categories

Figure A1a show the development of the eight CN-categories between 2000 and 2013. Figure A1b show the percentage distribution between them.

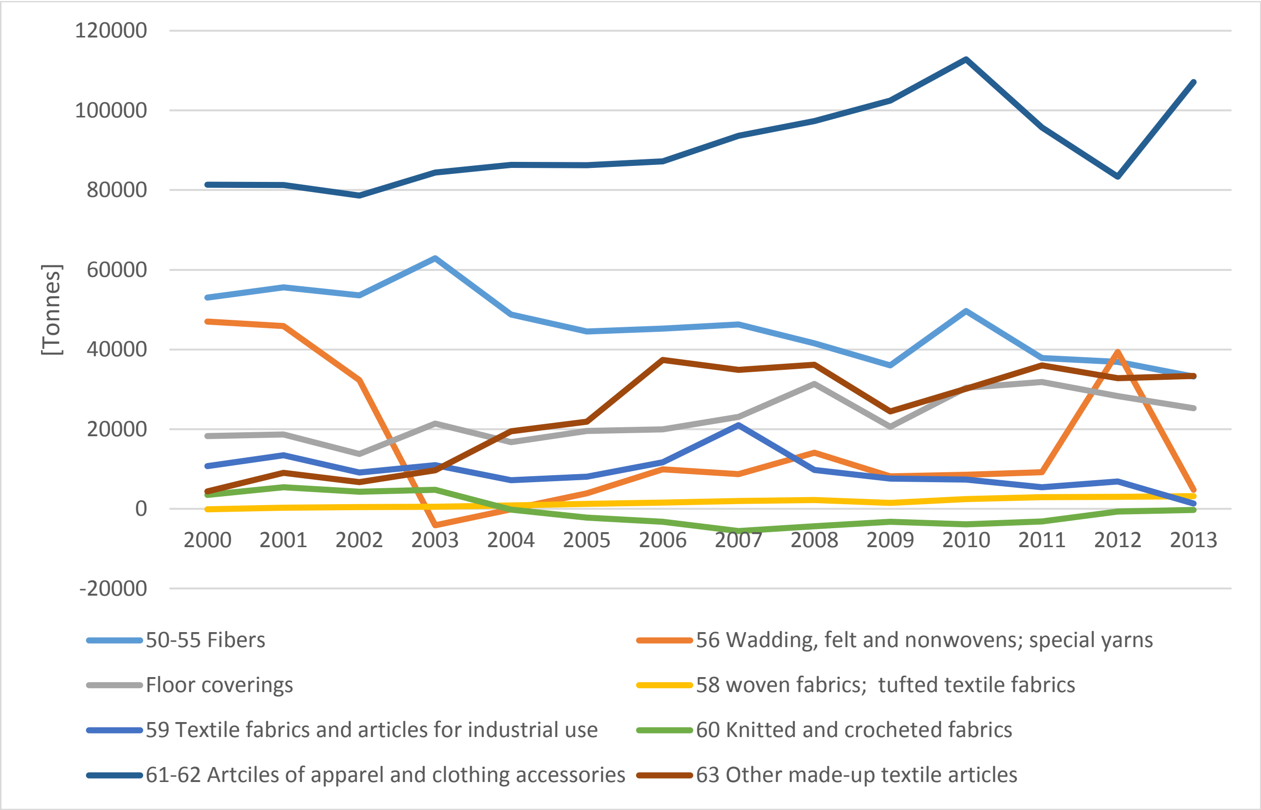

Figure A1a *Yearly development for textile CN-categories*

Clothing and Household is increasing (CN 57, 61-63). The rest of the CN-categories are generally decreasing. Some of the bigger fluctuations may be a result of variances in the level of details for import, export or domestic production.

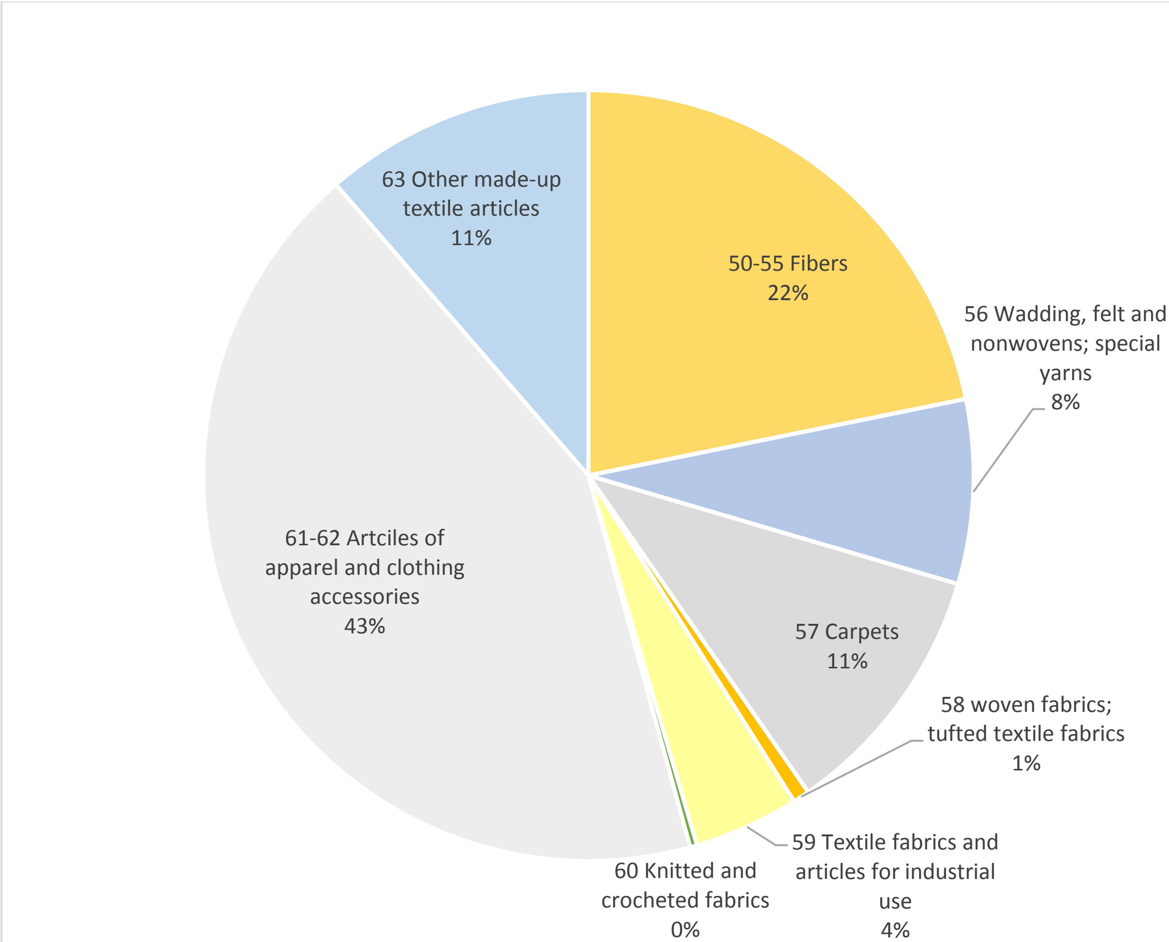

Figure A1b *Breakdown of CN classification 2000-2013. Based on accumulated weight. (0% is representing 0% < CN <1%)*

CN 61-62 dominates the textile consumption (43%), followed by CN 50-55 (22%), CN 63 (11%), CN 57 (11%), CN 56 (8%) and CN 58, 59 and 60 < 5 % (Figure A1b).

A2 - Detailed statistics for 2000, 2007 and 2013

Table A2a show detailed statistics for the years 2000, 2007 and 2013. The following statistics was converted from Statistics Sweden to work as input data in the GaBi model.

Table A2a Detailed statistics for 2000, 2007 and 2013

CLOTHING																
Tops	Specific consumption [tonnes]			Specific weight/ product [kg]	Cotton [tonnes]						Wool [tonnes]					
	2000	**2007**	**2013**		**2000**		**2007**		**2013**		**2000**		**2007**		**2013**	
Shirts	6875	7659	6851	0,20	4612	67%	5998	78%	4812	70%	50	1%	17	0%	10	0%
Jumpers	10794	11181	12054	0,50	6472	60%	7208	64%	6420	53%	689	6%	1109	10%	812	7%
T-shirts	11620	13096	10496	0,16	11136	96%	12618	96%	9822	94%	52	0%	94	1%	72	1%
Jackets	Specific consumption [tonnes]			Specific weight/ product [kg]	Cotton [tonnes]						Wool [tonnes]					
	2000	**2007**	**2013**		**2000**		**2007**		**2013**		**2000**		**2007**		**2013**	
Jackets	5299	8348	7333	0,40	649	12%	2459	29%	1810	25%	648	12%	1090	13%	359	5%
Bottoms	Specific consumption [tonnes]			Specific weight/ product [kg]	Cotton [tonnes]						Wool [tonnes]					
	2000	**2007**	**2013**		**2000**		**2007**		**2013**		**2000**		**2007**		**2013**	
Trousers	17414	21176	20357	0,30	11346	65%	16742	79%	16441	81%	0	0%	0	0%	0	0%
Underwear	Specific consumption [tonnes]			Specific weight/ product [kg]	Cotton [tonnes]						Wool [tonnes]					
	2000	**2007**	**2013**		**2000**		**2007**		**2013**		**2000**		**2007**		**2013**	
Negligées and bathrobes	1104	1079	1268	0,53	825	75%	858	80%	777	61%	0	0%	0	0%	0	0%
nightdresses and pyjamas	1134	1127	952	0,20	912	80%	964	86%	744	78%	0	0%	0	0%	0	0%
Socks, Briefs, Panties	10745	13200	12711	0,06	5806	54%	12227	93%	11576	91%	0	0%	0	0%	0	0%
slips and petticoats	9	72	36	0,10	0	0%	47	64%	4	10%	0	0%	0	0%	0	0%
Suits, Blazers etc.	Specific consumption [tonnes]			Specific weight/ product [kg]	Cotton [tonnes]						Wool [tonnes]					
	2000	**2007**	**2013**		**2000**		**2007**		**2013**		**2000**		**2007**		**2013**	
Suits	503	284	124	0,75	10	2%	7	2%	1	1%	319	63%	213	75%	104	84%
Blazers	2757	2476	2582	0,40	725	26%	1003	41%	778	30%	584	21%	307	12%	306	12%
Ensembles	1006	550	216	0,30	419	42%	340	62%	66	31%	30	3%	10	2%	3	1%
Costumes	131	53	11	0,20	30	23%	23	42%	11	100%	18	14%	4	7%	0	0%
Dresses, skirts	Specific consumption [tonnes]			Specific weight/ product [kg]	Cotton [tonnes]						Wool [tonnes]					
	2000	**2007**	**2013**		**2000**		**2007**		**2013**		**2000**		**2007**		**2013**	
Dresses	1335	2105	3402	0,20	437	33%	1090	52%	1183	35%	0	0%	0	0%	0	0%
Skirts	1926	3877	3784	0,20	670	35%	3456	89%	3385	89%	0	0%	0	0%	0	0%
Training	Specific consumption [tonnes]			Specific weight/ product [kg]	Cotton [tonnes]						Wool [tonnes]					
	2000	**2007**	**2013**		**2000**		**2007**		**2013**		**2000**		**2007**		**2013**	
Tracksuits and ski suits	3339	4240	2365	0,5	1303	39%	1413	33%	771	33%	0	0%	0	0%	0	0%

CLOTHING																			
Tops	Viscose [tonnes]						Polyester [tonnes]						Nylon [tonnes]						Life time: Number of washes*
	2000		**2007**		**2013**		**2000**		**2007**		**2013**		**2000**		**2007**		**2013**		
Shirts	421	6%	312	4%	385	6%	1284	19%	953	12%	1177	17%	509	7%	378	5%	467	7%	50
Jumpers	690	6%	544	5%	916	8%	2108	20%	1662	15%	2796	23%	836	8%	659	6%	1109	9%	50
T-shirts	82	1%	73	1%	114	1%	250	2%	223	2%	349	3%	99	1%	88	1%	138	1%	25
Jackets	Viscose [tonnes]						Polyester [tonnes]						Nylon [tonnes]						Life time: Number of washes*
	2000		**2007**		**2013**		**2000**		**2007**		**2013**		**2000**		**2007**		**2013**		
Jackets	760	14%	912	11%	981	13%	2321	44%	2783	33%	2995	41%	920	17%	1104	13%	1188	16%	**20**
Bottoms	Viscose [tonnes]						Polyester [tonnes]						Nylon [tonnes]						Life time: Number of washes*
	2000		**2007**		**2013**		**2000**		**2007**		**2013**		**2000**		**2007**		**2013**		
Trousers	0	0%	0	0%	0	0%	4368	25%	3193	15%	2820	14%	1699	10%	1242	6%	1096	5%	**67**
Underwear	Viscose [tonnes]						Polyester [tonnes]						Nylon [tonnes]						Life time: Number of washes*
	2000		**2007**		**2013**		**2000**		**2007**		**2013**		**2000**		**2007**		**2013**		
Negligées and bathrobes	53	5%	42	4%	93	7%	162	15%	128	12%	285	22%	64	6%	51	5%	113	9%	24
nightdresses and pyjamas	42	4%	31	3%	40	4%	128	11%	95	8%	121	13%	51	4%	38	3%	48	5%	52
Socks, Briefs, Panties	938	9%	185	1%	216	2%	2865	27%	565	4%	658	5%	1136	11%	224	2%	261	2%	104
slips and petticoats	2	19%	5	7%	6	17%	5	58%	15	21%	19	52%	2	23%	6	8%	7	21%	104
Suits, Blazers etc.	Viscose [tonnes]						Polyester [tonnes]						Nylon [tonnes]						Life time: Number of washes*
	2000		**2007**		**2013**		**2000**		**2007**		**2013**		**2000**		**2007**		**2013**		
Suits	0	0%	0	0%	0	0%	125	25%	46	16%	14	11%	49	10%	18	6%	5	4%	40
Blazers	0	0%	0	0%	0	0%	1043	38%	839	34%	1078	42%	406	15%	326	13%	419	16%	40
Ensembles	0	0%	0	0%	0	0%	401	40%	144	26%	106	49%	156	15%	56	10%	41	19%	40
Costumes	0	0%	0	0%	0	0%	60	46%	20	37%	0	0%	23	18%	8	14%	0	0%	40
Dresses, skirts	Viscose [tonnes]						Polyester [tonnes]						Nylon [tonnes]						Life time: Number of washes*
	2000		**2007**		**2013**		**2000**		**2007**		**2013**		**2000**		**2007**		**2013**		
Dresses	261	20%	393	19%	763	22%	459	34%	448	21%	1048	31%	178	13%	174	8%	408	12%	15
Skirts	41	2%	16	0%	19	1%	875	45%	291	8%	273	7%	340	18%	113	3%	106	3%	24
Training	Viscose [tonnes]						Polyester [tonnes]						Nylon [tonnes]						Life time: Number of washes*
	2000		**2007**		**2013**		**2000**		**2007**		**2013**		**2000**		**2007**		**2013**		
Tracksuits and ski suits	314	9%	400	9%	279	12%	1234	37%	1741	41%	942	40%	487	15%	686	16%	373	16%	**12**

	Specific consumption [tonnes]			Specific weight/ product [kg]	Cotton [tonnes]						Wool [tonnes]					
Accessories**	**2000**	**2007**	**2013**		**2000**		**2007**		**2013**		**2000**		**2007**		**2013**	
gloves	608	500	1022	0,05	608	100%	500	100%	1022	100%	0	0%	0	0%	0	0%
Handkerchiefs	18	19	14	0,05	18	100%	19	100%	14	100%	0	0%	0	0%	0	0%
Scarves	97	161	234	0,12	97	100%	161	100%	234	100%	0	0%	0	0%	0	0%
Ties	35	66	57	0,05	35	100%	66	100%	57	100%	0	0%	0	0%	0	0%

Household

	Specific consumption [tonnes]			Specific weight/ product [kg]	Cotton [tonnes]						Wool [tonnes]					
	2000	**2007**	**2013**		**2000**		**2007**		**2013**		**2000**		**2007**		**2013**	
Bed linens	1438	2279	962	0,90	1438	100%	2279	100%	962	100%	0	0%	0	0%	0	0%
Towels	8993	15440	11570	0,30	8993	100%	15440	100%	11570	100%	0	0%	0	0%	0	0%
Table linens	3221	5496	4483	0,80	3221	100%	5496	100%	4483	100%	0	0%	0	0%	0	0%
Curtain	1083	4209	2448	0,60	1083	100%	4209	100%	2448	100%	0	0%	0	0%	0	0%
Floor coverings	6164	8412	4321	0,90	3172	51%	4058	48%	2713	63%	2991	16%	4353	52%	1607	37%

	Viscose [tonnes]						Polyester [tonnes]						Nylon [tonnes]						Life time: Number of washes*
Accessories	**2000**		**2007**		**2013**		**2000**		**2007**		**2013**		**2000**		**2007**		**2013**		
gloves	0	0%	0	0%	0	0%	664	43%	969	52%	1541	49%	258	17%	377	20%	599	19%	4
Handkerchiefs	0	0%	0	0%	0	0%	3	14%	3	13%	5	24%	1	6%	1	5%	2	9%	0
Scarves	0	0%	0	0%	0	0%	195	53%	547	59%	620	57%	76	21%	213	23%	241	22%	12
Ties	0	0%	0	0%	0	0%	79	55%	174	57%	120	54%	31	21%	68	22%	47	21%	0

Household

	Viscose [tonnes]						Polyester [tonnes]						Nylon [tonnes]						Life time: Number of washes*
	2000		**2007**		**2013**		**2000**		**2007**		**2013**		**2000**		**2007**		**2013**		
Bed linens	9	1%	31	1%	65	5%	84	5%	173	7%	200	0	33	2%	68	3%	79	6%	80
Towels	93	1%	149	1%	388	2%	1038	10%	2193	12%	4072	0	406	4%	856	5%	1593	9%	100
Table linens	2	0%	3	0%	8	0%	9	0%	20	0%	54	0	3	0%	8	0%	21	0%	25
Curtain	0	0%	7	0%	7	0%	377	23%	2000	29%	2626	0	147	9%	778	11%	1021	17%	20
Floor coverings	1561	9%	1949	8%	2779	11%	4764	26%	5951	26%	8484	0	5750	32%	6723	29%	9688	38%	5

* Beton. A et al, 2006

mean value from *

SMED,2014

Own assumption

Mean value from Beton. A et al, 2006

APPENDIX B – LIFE CYCLE ASSESSMENT

This section presents the processes used in the GaBi model, the model setup and the LCI data for the AP, EP, GWP, HTP, TETP, Energy demand and Water use.

B1. PROCESSES IN MODEL

Table B1a shows all the processes used in the GaBi model.

Table B1a All processes used in GaBi

Process	Unit	Origin*	Source	Comments
Production				
Electricity grid mix	MJ	EU-27	PE International	
Polyamide 6.6 fibres	kg	EU-27	PE International	Nylon
Polyethylene terephthalate fibres (PET)	kg	EU-27	PE International	Polyester
Cotton fiber	kg	GLO	PE International	
Viscose fibres	kg	GLO	EcoInvent	
wool, sheep	kg	US	EcoInvent	
Modified starch	kg	RER	PE International	
Truck trailer	km	GLO	PE International	
Direct dyes	kg	EU-27	PE International	This process is taken from an elder version; GaBi 4.0
Thermal energy from hard coal	MJ	EU-27	PE International	
Use phase				
Tap water	kg	EU-27	PE International	
Electricity grid mix	MJ	SE	Pe International	
Sewage, treatment plant	kg	CH	PE International	Class 3
Detergent:	**kg**		**Bourrier. C (2011)**	**Own produced process**
Zeolite	Kg	RER	PE International	
Sodium carbonate	Kg	RER	PE International	powder
Perborate tetra hydrate	Kg	RER	PE International	
Perborate mono hydrate	Kg	RER	PE International	
Waste management				
Landfill of textiles	MJ	EU-27	PE International	
Incineration of textiles	MJ	EU-27	PE International	
Electricity grid mix	MJ	SE	PE International	
Thermal energy from biogas	MJ	SE	PE International	
Transportation				

Commodity carrier, Bulk, light fuel	km	GLO	PE International	Transport 1
Truck trailer	Km	GLO	PE International	Transport 2
**EU27- Europe and 27 member countries , GLO = Global, SE = Sweden, CH = Switzerland, RER = Europe*				

B2. MODEL SETUP IN GABI

The following figures presents the GaBi setup. Figure B2a is the main plan which everything is calculated from. Figure B2b is the Production plan, Figure B2c the Use phase plan and Figure B2d the Waste management plan.

Figure B2a *Main plan of the textile model in GaBi*

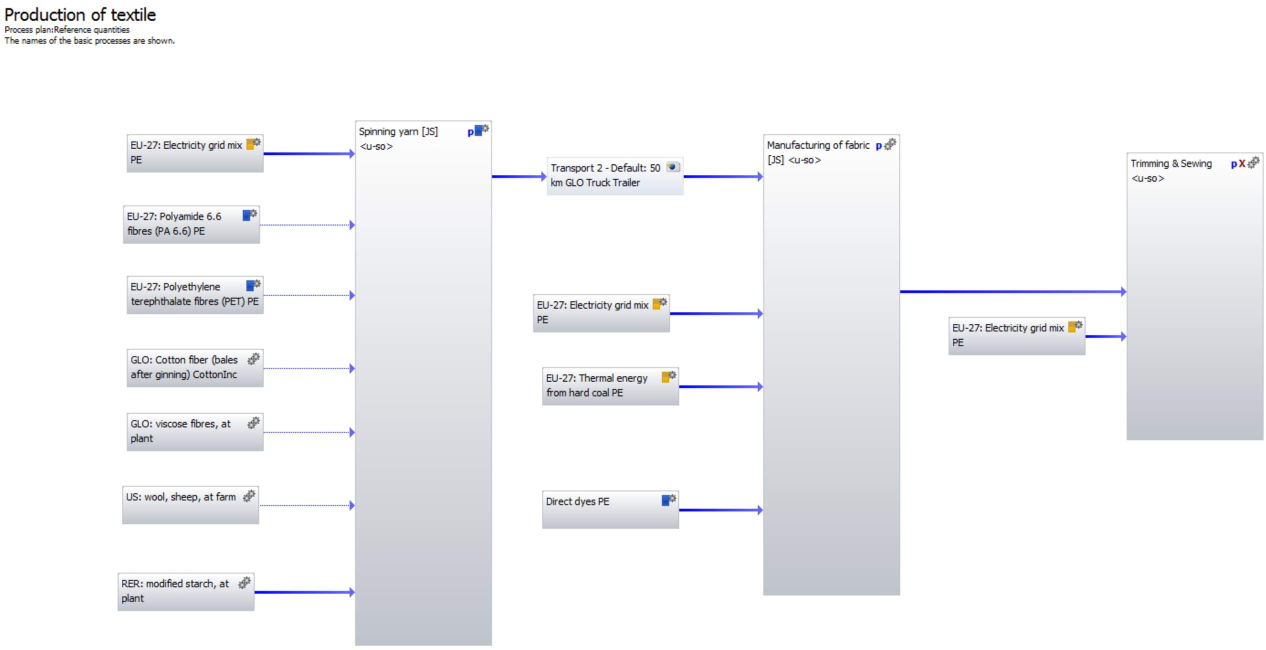

Figure B2b *Production phase of 1 kg textile*

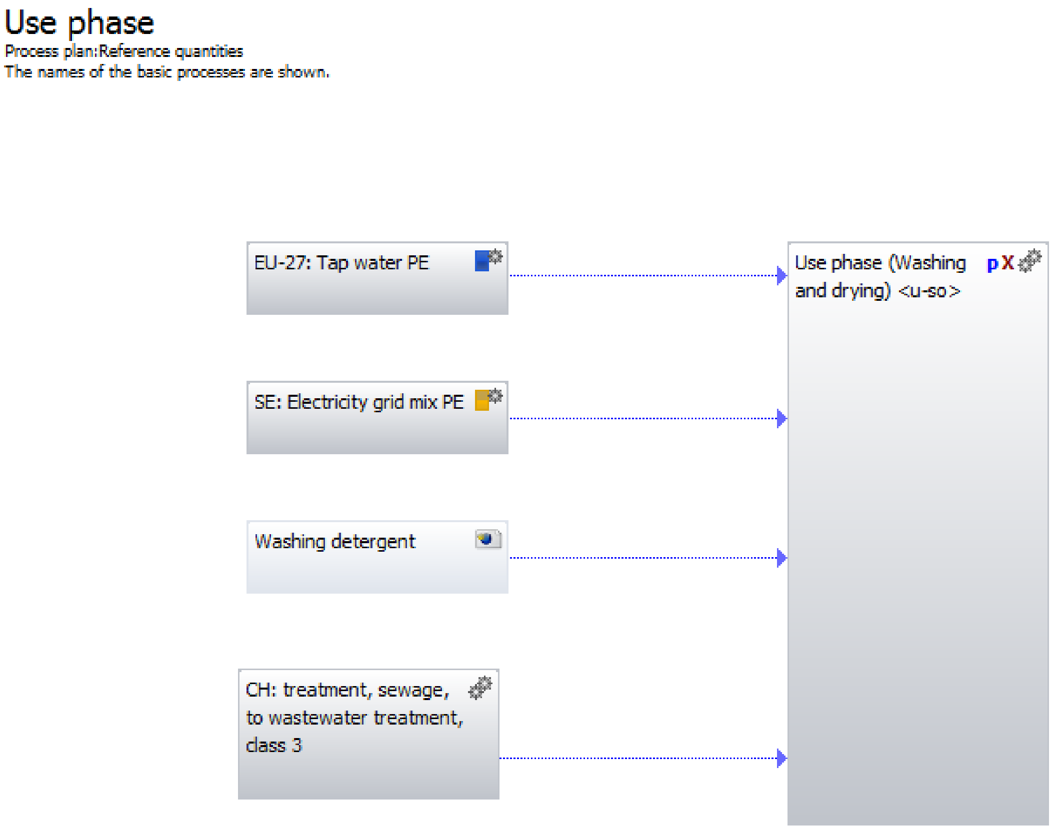

Figure B2c *Use phase of 1 kg textile*

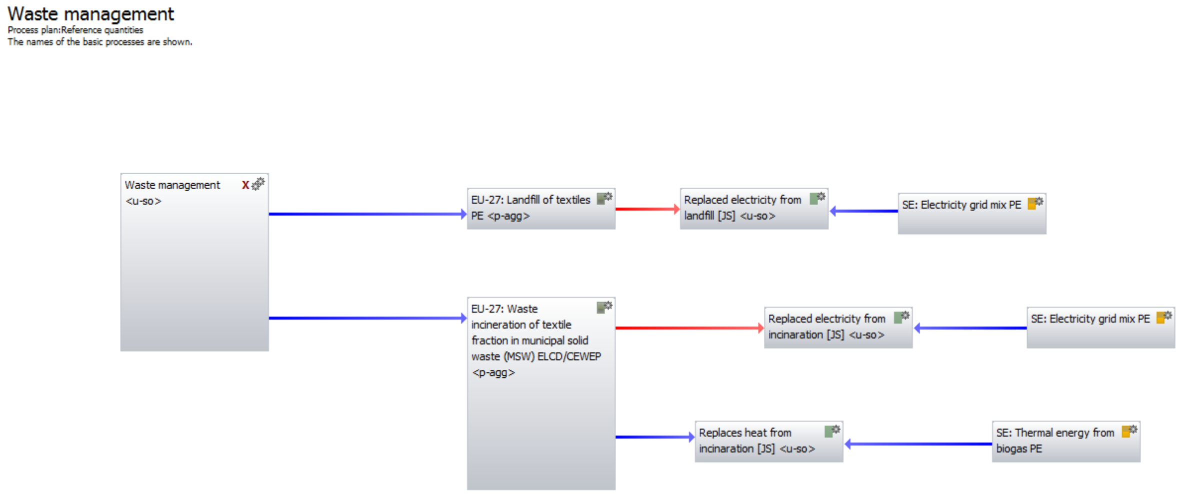

Figure B2d *Waste management of 1 kg textile*

B.3 LCI DATA

The LCI data for the environmental impact categories AP, EP, GWP, HTP, TETP energy and water are presented below. The data represent the total consumption per product and year.

Table B3a CML2001 - Apr. 2013, Acidification Potential (AP) [kg SO2-Equiv.]

	2000	2000	2000	2000	2000	2000	2007	2007	2007	2007	2007	2007	2013	2013	2013	2013	2013	2013
Products	Total	Productior	Transport :	Transport :	Use phase	Waste managem ent	Total	Productior	Transport :	Transport :	Use phase	Waste managem ent	Total	Productior	Transport :	Transport :	Use phase	Waste managem ent
Shirts	7,34E+05	6,07E+05	1,16E+04	7,23E+01	1,20E+05	-5,27E+03	7,82E+05	6,41E+05	1,29E+04	8,06E+01	1,34E+05	-5,87E+03	7,05E+05	5,79E+05	1,15E+04	7,21E+01	1,20E+05	-5,25E+03
Jumpers	1,37E+06	1,17E+06	1,82E+04	1,14E+02	1,89E+05	-8,28E+03	1,59E+06	1,39E+06	1,88E+04	1,18E+02	1,96E+05	-8,57E+03	1,58E+06	1,36E+06	2,03E+04	1,27E+02	2,11E+05	-9,24E+03
T-shirts	1,08E+06	9,65E+05	1,96E+04	1,22E+02	1,02E+05	-8,91E+03	1,27E+06	1,14E+06	2,20E+04	1,38E+02	1,15E+05	-1,00E+04	1,01E+06	9,13E+05	1,77E+04	1,10E+02	9,19E+04	-8,05E+03
Trousers	5,60E+05	4,31E+05	8,92E+03	5,58E+01	1,24E+05	-4,06E+03	8,87E+05	6,83E+05	1,41E+04	8,78E+01	1,96E+05	-6,40E+03	7,79E+05	6,00E+05	1,23E+04	7,71E+01	1,72E+05	-5,62E+03
Jackets	2,47E+06	2,34E+06	2,93E+04	1,83E+02	1,22E+05	-1,34E+04	3,08E+06	2,91E+06	3,56E+04	2,23E+02	1,48E+05	-1,62E+04	2,32E+06	2,16E+06	3,43E+04	2,14E+02	1,43E+05	-1,56E+04
Negligees an	1,03E+05	9,31E+04	1,86E+03	1,16E+01	9,27E+03	-8,46E+02	1,01E+05	9,07E+04	1,82E+03	1,13E+01	9,06E+03	-8,27E+02	1,19E+05	1,07E+05	2,13E+03	1,33E+01	1,07E+04	-9,72E+02
Nightdresses	1,17E+05	9,48E+04	1,91E+03	1,19E+01	2,06E+04	-8,69E+02	1,16E+05	9,42E+04	1,90E+03	1,19E+01	2,05E+04	-8,64E+02	9,80E+04	7,98E+04	1,60E+03	1,00E+01	1,73E+04	-7,30E+02
Socks, Briefs,	1,32E+06	9,19E+05	1,81E+04	1,13E+02	3,91E+05	-8,24E+03	1,59E+06	1,10E+06	2,22E+04	1,39E+02	4,81E+05	-1,01E+04	1,53E+06	1,06E+06	2,14E+04	1,34E+02	4,63E+05	-9,75E+03
Slips, Pettico	8,82E+02	7,54E+02	1,44E+01	9,01E-02	1,20E+02	-6,56E+00	7,21E+03	6,13E+03	1,22E+02	7,61E-01	1,01E+03	-5,55E+01	3,69E+03	3,15E+03	6,06E+01	3,79E-01	5,04E+02	-2,76E+01
Suits	1,75E+05	1,67E+05	8,47E+02	5,29E+00	7,04E+03	-3,86E+02	1,12E+05	1,08E+05	4,77E+02	2,98E+00	3,97E+03	-2,17E+02	5,35E+04	5,17E+04	2,09E+02	1,30E+00	1,74E+03	-9,51E+01
Blazers	4,94E+05	4,52E+05	4,64E+03	2,90E+01	3,86E+04	-2,11E+03	3,55E+05	3,18E+05	4,17E+03	2,61E+01	3,47E+04	-1,90E+03	3,69E+05	3,30E+05	4,35E+03	2,72E+01	3,62E+04	-1,98E+03
Ensembles	1,08E+05	9,28E+04	1,69E+03	1,06E+01	1,41E+04	-7,71E+02	5,72E+04	4,90E+04	9,26E+02	5,79E+00	7,70E+03	-4,22E+02	2,13E+04	1,81E+04	3,64E+02	2,27E+00	3,03E+03	-1,66E+02
Costumes	1,98E+04	1,78E+04	2,20E+02	1,38E+00	1,83E+03	-1,00E+02	6,59E+03	5,79E+03	8,99E+01	5,62E-01	7,48E+02	-4,10E+01	1,11E+03	9,44E+02	1,92E+01	1,20E-01	1,60E+02	-8,75E+00
Dresses	1,28E+05	1,20E+05	2,25E+03	1,40E+01	7,01E+03	-1,02E+03	2,03E+05	1,90E+05	3,54E+03	2,21E+01	1,11E+04	-1,61E+03	3,31E+05	3,10E+05	5,73E+03	3,58E+01	1,79E+04	-2,61E+03
Skirts	1,74E+05	1,56E+05	3,24E+03	2,03E+01	1,62E+04	-1,48E+03	3,55E+05	3,19E+05	6,52E+03	4,08E+01	3,26E+04	-2,97E+03	3,49E+05	3,13E+05	6,37E+03	3,98E+01	3,18E+04	-2,90E+03
Tracksuits an	3,00E+05	2,83E+05	5,62E+03	3,51E+01	1,40E+04	-2,56E+03	3,79E+05	3,57E+05	7,14E+03	4,46E+01	1,78E+04	-3,25E+03	2,16E+05	2,04E+05	3,98E+03	2,49E+01	9,94E+03	-1,81E+03
Gloves	1,26E+05	1,23E+05	2,57E+03	1,61E+01	2,14E+03	-1,17E+03	1,51E+05	1,46E+05	3,11E+03	1,94E+01	2,58E+03	-1,41E+03	2,60E+05	2,52E+05	5,32E+03	3,33E+01	4,43E+03	-2,42E+03
Handkerchie	1,88E+03	1,86E+03	3,81E+01	2,38E-01	0,00E+00	-1,74E+01	1,97E+03	1,95E+03	4,00E+01	2,50E-01	0,00E+00	-1,82E+01	1,70E+03	1,68E+03	3,49E+01	2,18E-01	0,00E+00	-1,59E+01
Scarves	3,23E+04	3,05E+04	6,20E+02	3,87E+00	1,55E+03	-2,82E+02	7,74E+04	7,27E+04	1,55E+03	9,68E+00	3,87E+03	-7,06E+02	9,24E+04	8,68E+04	1,84E+03	1,15E+01	4,60E+03	-8,40E+02
Ties	1,17E+04	1,15E+04	2,44E+02	1,53E+00	0,00E+00	-1,11E+02	2,46E+04	2,43E+04	5,17E+02	3,23E+00	0,00E+00	-2,35E+02	1,80E+04	1,78E+04	3,77E+02	2,36E+00	0,00E+00	-1,72E+02
Bed linens	1,75E+05	1,30E+05	2,63E+03	1,64E+01	4,38E+04	-1,20E+03	2,85E+05	2,11E+05	4,30E+03	2,68E+01	7,15E+04	-1,96E+03	1,48E+05	1,10E+05	2,20E+03	1,37E+01	3,66E+04	-1,00E+03
Towels	1,25E+06	8,70E+05	1,77E+04	1,11E+02	3,69E+05	-8,07E+03	2,21E+06	1,54E+06	3,14E+04	1,96E+02	6,53E+05	-1,43E+04	2,08E+06	1,45E+06	2,97E+04	1,85E+02	6,17E+05	-1,35E+04
Table linens	2,99E+05	2,68E+05	5,44E+03	3,40E+01	2,83E+04	-2,48E+03	5,11E+05	4,57E+05	9,30E+03	5,81E+01	4,84E+04	-4,24E+03	4,22E+05	3,78E+05	7,68E+03	4,80E+01	4,00E+04	-3,50E+03
Curtains	1,43E+05	1,30E+05	2,70E+03	1,69E+01	1,13E+04	-1,23E+03	6,22E+05	5,66E+05	1,18E+04	7,36E+01	4,90E+04	-5,36E+03	5,38E+05	4,89E+05	1,03E+04	6,42E+01	4,27E+04	-4,68E+03
Floor coverin	2,80E+06	2,76E+06	3,07E+04	1,92E+02	3,19E+04	-1,40E+04	3,80E+06	3,74E+06	3,88E+04	2,42E+02	4,03E+04	-1,77E+04	2,90E+06	2,83E+06	4,25E+04	2,66E+02	4,42E+04	-1,94E+04
TOTALT	1,40E+07	1,22E+07	1,91E+05	1,19E+03	1,66E+06	-8,68E+04	1,86E+07	1,62E+07	2,53E+05	1,58E+03	2,28E+06	-1,15E+05	1,60E+07	1,37E+07	2,42E+05	1,51E+03	2,12E+06	-1,10E+05

Table B3b CML2001 - Apr. 2013, Eutrophication Potential (EP) [kg Phosphate-Equiv.]

	2000	2000	2000	2000	2000	2000	2007	2007	2007	2007	2007	2007	2013	2013	2013	2013	2013	2013
Products	Total	Productior	Transport :	Transport :	Use phase	Waste managem ent	Total	Productior	Transport :	Transport :	Use phase	Waste managem ent	Total	Productior	Transport :	Transport :	Use phase	Waste managem ent
Shirts	1,56E+05	7,75E+04	2,73E+03	1,83E+01	7,65E+04	-4,50E+02	1,60E+05	7,27E+04	3,04E+03	2,04E+01	8,52E+04	-5,01E+02	1,44E+05	6,58E+04	2,72E+03	1,83E+01	7,62E+04	-4,48E+02
Jumpers	3,40E+05	2,16E+05	4,29E+03	2,88E+01	1,20E+05	-7,06E+02	4,31E+05	3,03E+05	4,45E+03	2,98E+01	1,24E+05	-7,31E+02	4,02E+05	2,64E+05	4,79E+03	3,22E+01	1,34E+05	-7,88E+02
T-shirts	1,80E+05	1,11E+05	4,62E+03	3,10E+01	6,46E+04	-7,60E+02	2,26E+05	1,49E+05	5,21E+03	3,49E+01	7,29E+04	-8,56E+02	1,80E+05	1,18E+05	4,17E+03	2,80E+01	5,84E+04	-6,86E+02
Trousers	1,26E+05	4,53E+04	2,11E+03	1,41E+01	7,90E+04	-3,47E+02	2,02E+05	7,45E+04	3,32E+03	2,23E+01	1,24E+05	-5,46E+02	1,78E+05	6,58E+04	2,92E+03	1,96E+01	1,09E+05	-4,80E+02
Jackets	6,15E+05	5,32E+05	6,92E+03	4,65E+01	7,75E+04	-1,14E+03	7,86E+05	6,85E+05	8,42E+03	5,65E+01	9,43E+04	-1,38E+03	4,70E+05	3,73E+05	8,09E+03	5,43E+01	9,06E+04	-1,33E+03
Negligees an	1,69E+04	1,06E+04	4,39E+02	2,94E+00	5,90E+03	-7,22E+01	1,65E+04	1,03E+04	4,29E+02	2,88E+00	5,76E+03	-7,05E+01	1,92E+04	1,20E+04	5,04E+02	3,38E+00	6,77E+03	-8,29E+01

Nightdresses	2,43E+04	1,08E+04	4,51E+02	3,02E+00	1,31E+04	-7,41E+01	2,42E+04	1,08E+04	4,48E+02	3,01E+00	1,30E+04	-7,37E+01	2,04E+04	9,05E+03	3,78E+02	2,54E+00	1,10E+04	-6,23E+01
Socks, Briefs,	3,56E+05	1,04E+05	4,27E+03	2,87E+01	2,49E+05	-7,03E+02	4,35E+05	1,25E+05	5,25E+03	3,52E+01	3,06E+05	-8,63E+02	4,20E+05	1,22E+05	5,05E+03	3,39E+01	2,94E+05	-8,31E+02
Slips, Pettico	1,61E+02	8,24E+01	3,40E+00	2,28E-02	7,62E+01	-5,60E-01	1,36E+03	6,92E+02	2,88E+01	1,93E-01	6,44E+02	-4,73E+00	6,79E+02	3,46E+02	1,43E+01	9,60E-02	3,20E+02	-2,35E+00
Suits	6,45E+04	5,98E+04	2,00E+02	1,34E+00	4,48E+03	-3,29E+01	4,24E+04	3,98E+04	1,13E+02	7,57E-01	2,53E+03	-1,86E+01	2,05E+04	1,94E+04	4,93E+01	3,31E-01	1,10E+03	-8,11E+00
Blazers	1,49E+05	1,24E+05	1,10E+03	7,35E+00	2,45E+04	-1,80E+02	9,53E+04	7,24E+04	9,85E+02	6,61E+00	2,20E+04	-1,62E+02	9,85E+04	7,47E+04	1,03E+03	6,89E+00	2,30E+04	-1,69E+02
Ensembles	2,26E+04	1,33E+04	4,00E+02	2,68E+00	8,95E+03	-6,58E+01	1,17E+04	6,61E+03	2,19E+02	1,47E+00	4,90E+03	-3,60E+01	4,02E+03	2,02E+03	8,59E+01	5,76E-01	1,92E+03	-1,41E+01
Costumes	5,44E+03	4,23E+03	5,21E+01	3,49E-01	1,17E+03	-8,57E+00	1,58E+03	1,09E+03	2,12E+01	1,43E-01	4,76E+02	-3,49E+00	2,14E+02	1,09E+02	4,54E+00	3,05E-02	1,02E+02	-7,46E-01
Dresses	1,92E+04	1,43E+04	5,31E+02	3,56E+00	4,46E+03	-8,73E+01	3,10E+04	2,33E+04	8,37E+02	5,62E+00	7,03E+03	-1,38E+02	5,01E+04	3,76E+04	1,35E+03	9,08E+00	1,14E+04	-2,22E+02
Skirts	2,64E+04	1,54E+04	7,66E+02	5,14E+00	1,03E+04	-1,26E+02	5,77E+04	3,57E+04	1,54E+03	1,03E+01	2,07E+04	-2,54E+02	5,69E+04	3,54E+04	1,50E+03	1,01E+01	2,02E+04	-2,47E+02
Tracksuits an	4,07E+04	3,07E+04	1,33E+03	8,91E+00	8,92E+03	-2,18E+02	5,09E+04	3,81E+04	1,69E+03	1,13E+01	1,13E+04	-2,77E+02	2,96E+04	2,25E+04	9,40E+02	6,31E+00	6,32E+03	-1,55E+02
Gloves	1,39E+04	1,20E+04	6,08E+02	4,08E+00	1,36E+03	-1,00E+02	1,60E+04	1,37E+04	7,34E+02	4,92E+00	1,64E+03	-1,21E+02	2,79E+04	2,41E+04	1,26E+03	8,44E+00	2,82E+03	-2,07E+02
Handkerchief	2,11E+02	2,03E+02	9,01E+00	6,04E-02	0,00E+00	-1,48E+00	2,22E+02	2,14E+02	9,45E+00	6,34E-02	0,00E+00	-1,55E+00	1,85E+02	1,78E+02	8,23E+00	5,53E-02	0,00E+00	-1,35E+00
Scarves	4,14E+03	3,03E+03	1,46E+02	9,82E-01	9,83E+02	-2,41E+01	9,37E+03	6,60E+03	3,66E+02	2,46E+00	2,46E+03	-6,02E+01	1,13E+04	8,00E+03	4,35E+02	2,92E+00	2,92E+03	-7,16E+01
Ties	1,12E+03	1,07E+03	5,77E+01	3,87E-01	0,00E+00	-9,49E+00	2,34E+03	2,24E+03	1,22E+02	8,19E-01	0,00E+00	-2,01E+01	1,74E+03	1,66E+03	8,91E+01	5,98E-01	0,00E+00	-1,47E+01
Bed linens	4,31E+04	1,48E+04	6,22E+02	4,17E+00	2,78E+04	-1,02E+02	7,02E+04	2,39E+04	1,01E+03	6,81E+00	4,54E+04	-1,67E+02	3,61E+04	1,25E+04	5,19E+02	3,48E+00	2,32E+04	-8,54E+01
Towels	3,35E+05	9,74E+04	4,19E+03	2,81E+01	2,34E+05	-6,89E+02	5,93E+05	1,72E+05	7,41E+03	4,97E+01	4,15E+05	-1,22E+03	5,54E+05	1,56E+05	7,01E+03	4,70E+01	3,92E+05	-1,15E+03
Table linens	4,98E+04	3,08E+04	1,29E+03	8,63E+00	1,80E+04	-2,12E+02	8,51E+04	5,25E+04	2,20E+03	1,47E+01	3,08E+04	-3,61E+02	7,02E+04	4,33E+04	1,82E+03	1,22E+01	2,54E+04	-2,99E+02
Curtains	2,15E+04	1,38E+04	6,39E+02	4,29E+00	7,15E+03	-1,05E+02	9,21E+04	5,86E+04	2,78E+03	1,87E+01	3,11E+04	-4,57E+02	7,71E+04	4,79E+04	2,43E+03	1,63E+01	2,72E+04	-3,99E+02
Floor coverin	7,13E+05	6,87E+05	7,25E+03	4,87E+01	2,03E+04	-1,19E+03	1,02E+06	9,86E+05	9,16E+03	6,15E+01	2,56E+04	-1,51E+03	5,44E+05	5,07E+05	1,00E+04	6,74E+01	2,81E+04	-1,65E+03
TOTALT	3,32E+06	2,23E+06	4,50E+04	3,02E+02	1,06E+06	-7,41E+03	4,46E+06	2,96E+06	5,98E+04	4,01E+02	1,45E+06	-9,83E+03	3,42E+06	2,02E+06	5,72E+04	3,84E+02	1,35E+06	-9,41E+03

Table B3c CML2001 - Apr. 2013, Global Warming Potential (GWP 100 years) [kg CO2-Equiv.]

Products	2000 Total	2000 Productior	2000 Transport :	2000 Transport :	2000 Use phase	2000 Waste managem ent	2007 Total	2007 Productior	2007 Transport :	2007 Transport :	2007 Use phase	2007 Waste managem ent	2013 Total	2013 Productior	2013 Transport :	2013 Transport :	2013 Use phase	2013 Waste managem ent
Shirts	1,42E+08	9,67E+07	1,30E+06	1,63E+04	3,48E+07	8,89E+06	1,51E+08	1,01E+08	1,44E+06	1,81E+04	3,87E+07	9,90E+06	1,39E+08	9,46E+07	1,29E+06	1,62E+04	3,47E+07	8,86E+06
Jumpers	2,33E+08	1,62E+08	2,03E+06	2,55E+04	5,46E+07	1,40E+07	2,42E+08	1,68E+08	2,11E+06	2,64E+04	5,66E+07	1,45E+07	2,66E+08	1,87E+08	2,27E+06	2,85E+04	6,10E+07	1,56E+07
T-shirts	1,87E+08	1,41E+08	2,19E+06	2,75E+04	2,94E+07	1,50E+07	2,13E+08	1,61E+08	2,47E+06	3,10E+04	3,31E+07	1,69E+07	1,71E+08	1,29E+08	1,98E+06	2,48E+04	2,65E+07	1,36E+07
Trousers	1,21E+08	7,71E+07	9,98E+05	1,25E+04	3,59E+07	6,85E+06	1,81E+08	1,13E+08	1,57E+06	1,97E+04	5,66E+07	1,08E+07	1,58E+08	9,74E+07	1,38E+06	1,73E+04	4,97E+07	9,48E+06
Jackets	3,84E+08	3,23E+08	3,28E+06	4,12E+04	3,52E+07	2,25E+07	4,45E+08	3,71E+08	3,99E+06	5,01E+04	4,28E+07	2,74E+07	4,21E+08	3,50E+08	3,83E+06	4,81E+04	4,12E+07	2,63E+07
Negligees an	1,93E+07	1,50E+07	2,08E+05	2,61E+03	2,68E+06	1,43E+06	1,85E+07	1,43E+07	2,03E+05	2,55E+03	2,62E+06	1,39E+06	2,32E+07	1,82E+07	2,39E+05	3,00E+03	3,08E+06	1,64E+06
Nightdresses	2,24E+07	1,48E+07	2,14E+05	2,68E+03	5,96E+06	1,47E+06	2,20E+07	1,44E+07	2,12E+05	2,66E+03	5,93E+06	1,46E+06	1,91E+07	1,27E+07	1,79E+05	2,25E+03	5,01E+06	1,23E+06
Socks, Briefs,	2,90E+08	1,61E+08	2,02E+06	2,54E+04	1,13E+08	1,39E+07	3,22E+08	1,63E+08	2,49E+06	3,12E+04	1,39E+08	1,71E+07	3,11E+08	1,58E+08	2,39E+06	3,00E+04	1,34E+08	1,64E+07
Slips, Pettico	2,05E+05	1,57E+05	1,61E+03	2,02E+01	3,46E+04	1,11E+04	1,43E+06	1,03E+06	1,36E+04	1,71E+02	2,93E+05	9,36E+04	8,38E+05	6,39E+05	6,78E+03	8,51E+01	1,46E+05	4,66E+04
Suits	1,49E+07	1,21E+07	9,47E+04	1,19E+03	2,04E+06	6,50E+05	8,61E+06	7,04E+06	5,34E+04	6,71E+02	1,15E+06	3,67E+05	3,87E+06	3,18E+06	2,34E+04	2,93E+02	5,02E+05	1,60E+05
Blazers	6,79E+07	5,26E+07	5,19E+05	6,52E+03	1,12E+07	3,56E+06	5,64E+07	4,27E+07	4,66E+05	5,85E+03	1,00E+07	3,20E+06	6,10E+07	4,67E+07	4,86E+05	6,10E+03	1,04E+07	3,34E+06
Ensembles	2,22E+07	1,66E+07	1,89E+05	2,38E+03	4,07E+06	1,30E+06	1,12E+07	8,20E+06	1,04E+05	1,30E+03	2,23E+06	7,11E+05	4,91E+06	3,72E+06	4,07E+04	5,11E+02	8,74E+05	2,79E+05
Costumes	3,20E+06	2,47E+06	2,47E+04	3,10E+02	5,30E+05	1,69E+05	1,19E+06	8,97E+05	1,01E+04	1,26E+02	2,16E+05	6,91E+04	1,98E+05	1,35E+05	2,15E+03	2,70E+01	4,62E+04	1,48E+04
Dresses	2,50E+07	2,10E+07	2,52E+05	3,16E+03	2,03E+06	1,73E+06	3,65E+07	3,02E+07	3,96E+05	4,98E+03	3,19E+06	2,72E+06	6,29E+07	5,27E+07	6,41E+05	8,04E+03	5,16E+06	4,40E+06
Skirts	3,98E+07	3,22E+07	3,63E+05	4,55E+03	4,68E+06	2,49E+06	6,44E+07	4,92E+07	7,30E+05	9,16E+03	9,41E+06	5,01E+06	6,27E+07	4,79E+07	7,13E+05	8,95E+03	9,19E+06	4,89E+06
Tracksuits an	6,25E+07	5,35E+07	6,29E+05	7,89E+03	4,05E+06	4,32E+06	8,08E+07	6,94E+07	7,99E+05	1,00E+04	5,15E+06	5,48E+06	4,51E+07	3,87E+07	4,45E+05	5,59E+03	2,87E+06	3,06E+06
Gloves	2,81E+07	2,52E+07	2,88E+05	3,62E+03	6,19E+05	1,98E+06	3,55E+07	3,20E+07	3,48E+05	4,36E+03	7,47E+05	2,39E+06	5,99E+07	5,40E+07	5,96E+05	7,48E+03	1,28E+06	4,09E+06
Handkerchief	3,38E+05	3,04E+05	4,27E+03	5,36E+01	0,00E+00	2,93E+04	3,50E+05	3,15E+05	4,48E+03	5,62E+01	0,00E+00	3,07E+04	3,28E+05	2,98E+05	3,90E+03	4,90E+01	0,00E+00	2,68E+04
Scarves	7,48E+06	6,49E+06	6,93E+04	8,70E+02	4,47E+05	4,76E+05	1,92E+07	1,67E+07	1,73E+05	2,18E+03	1,12E+06	1,19E+06	2,26E+07	1,96E+07	2,06E+05	2,59E+03	1,33E+06	1,42E+06
Ties	2,78E+06	2,56E+06	2,73E+04	3,43E+02	0,00E+00	1,88E+05	5,95E+06	5,50E+06	5,78E+04	7,26E+02	0,00E+00	3,97E+05	4,28E+06	3,95E+06	4,22E+04	5,30E+02	0,00E+00	2,90E+05
Bed linens	3,44E+07	1,94E+07	2,94E+05	3,70E+03	1,27E+07	2,02E+06	5,67E+07	3,23E+07	4,81E+05	6,03E+03	2,07E+07	3,30E+06	3,02E+07	1,77E+07	2,46E+05	3,09E+03	1,06E+07	1,69E+06
Towels	2,59E+08	1,36E+08	1,98E+06	2,49E+04	1,07E+08	1,36E+07	4,62E+08	2,46E+08	3,51E+06	4,41E+04	1,89E+08	2,41E+07	4,57E+08	2,53E+08	3,32E+06	4,17E+04	1,78E+08	2,28E+07
Table linens	5,14E+07	3,85E+07	6,09E+05	7,65E+03	8,18E+06	4,18E+06	8,79E+07	6,58E+07	1,04E+06	1,31E+04	1,40E+07	7,15E+06	7,31E+07	5,47E+07	8,60E+05	1,08E+04	1,15E+07	5,90E+06

Curtains	2,86E+07	2,30E+07	3,03E+05	3,80E+03	3,25E+06	2,08E+06	1,29E+08	1,04E+08	1,32E+06	1,65E+04	1,41E+07	9,04E+06	1,22E+08	1,01E+08	1,15E+06	1,44E+04	1,23E+07	7,89E+06
Floor coverin	4,04E+08	3,68E+08	3,44E+06	4,31E+04	9,23E+06	2,36E+07	5,11E+08	4,65E+08	4,34E+06	5,45E+04	1,17E+07	2,98E+07	5,54E+08	5,04E+08	4,76E+06	5,97E+04	1,28E+07	3,27E+07
TOTALT	2,45E+09	1,80E+09	2,13E+07	2,68E+05	4,81E+08	1,46E+08	3,16E+09	2,28E+09	2,83E+07	3,55E+05	6,58E+08	1,94E+08	3,07E+09	2,25E+09	2,71E+07	3,40E+05	6,12E+08	1,86E+08

Table B3d CML2001 - Apr. 2013, Human Toxicity Potential (HTP inf.) [kg DCB-Equiv.]

Products	2000 Total	2000 Productior	2000 Transport	2000 Transport	2000 Use phase	2000 Waste management	2007 Total	2007 Productior	2007 Transport	2007 Transport	2007 Use phase	2007 Waste management	2013 Total	2013 Productior	2013 Transport	2013 Transport	2013 Use phase	2013 Waste management
Shirts	2,53E+07	1,15E+07	5,04E+04	5,65E+02	1,39E+07	-1,84E+05	2,76E+07	1,22E+07	5,62E+04	6,30E+02	1,55E+07	-2,04E+05	2,51E+07	1,14E+07	5,02E+04	5,63E+02	1,39E+07	-1,83E+05
Jumpers	4,07E+07	1,90E+07	7,91E+04	8,88E+02	2,19E+07	-2,88E+05	4,25E+07	2,01E+07	8,20E+04	9,20E+02	2,26E+07	-2,98E+05	4,64E+07	2,22E+07	8,84E+04	9,91E+02	2,44E+07	-3,22E+05
T-shirts	2,90E+07	1,75E+07	8,52E+04	9,56E+02	1,18E+07	-3,10E+05	3,30E+07	2,00E+07	9,60E+04	1,08E+03	1,33E+07	-3,50E+05	2,64E+07	1,60E+07	7,70E+04	8,63E+02	1,06E+07	-2,80E+05
Trousers	2,20E+07	7,70E+06	3,89E+04	4,36E+02	1,44E+07	-1,41E+05	3,47E+07	1,22E+07	6,12E+04	6,87E+02	2,27E+07	-2,23E+05	3,05E+07	1,07E+07	5,38E+04	6,03E+02	1,99E+07	-1,96E+05
Jackets	5,06E+07	3,68E+07	1,28E+05	1,43E+03	1,41E+07	-4,65E+05	5,99E+07	4,31E+07	1,55E+05	1,74E+03	1,72E+07	-5,65E+05	5,62E+07	4,01E+07	1,49E+05	1,67E+03	1,65E+07	-5,43E+05
Negligees an	2,86E+06	1,81E+06	8,09E+03	9,08E+01	1,07E+06	-2,95E+04	2,76E+06	1,73E+06	7,91E+03	8,87E+01	1,05E+06	-2,88E+04	3,35E+06	2,14E+06	9,30E+03	1,04E+02	1,23E+06	-3,38E+04
Nightdresses	4,18E+06	1,81E+06	8,31E+03	9,32E+01	2,39E+06	-3,03E+04	4,12E+06	1,77E+06	8,26E+03	9,27E+01	2,37E+06	-3,01E+04	3,51E+06	1,52E+06	6,98E+03	7,83E+01	2,01E+06	-2,54E+04
Socks, Briefs,	6,40E+07	1,90E+07	7,88E+04	8,84E+02	4,53E+07	-2,87E+05	7,52E+07	1,98E+07	9,68E+04	1,09E+03	5,56E+07	-3,52E+05	7,28E+07	1,95E+07	9,32E+04	1,05E+03	5,35E+07	-3,39E+05
Slips, Pettico	3,15E+04	1,78E+04	6,28E+01	7,04E-01	1,39E+04	-2,29E+02	2,39E+05	1,23E+05	5,31E+02	5,95E+00	1,17E+05	-1,93E+03	1,30E+05	7,26E+04	2,64E+02	2,96E+00	5,83E+04	-9,61E+02
Suits	2,06E+06	1,26E+06	3,69E+03	4,14E+01	8,15E+05	-1,34E+04	1,22E+06	7,66E+05	2,08E+03	2,33E+01	4,60E+05	-7,57E+03	5,53E+05	3,54E+05	9,09E+02	1,02E+01	2,01E+05	-3,31E+03
Blazers	9,35E+06	4,94E+06	2,02E+04	2,27E+02	4,47E+06	-7,36E+04	8,04E+06	4,07E+06	1,82E+04	2,04E+02	4,01E+06	-6,61E+04	8,36E+06	4,23E+06	1,89E+04	2,12E+02	4,18E+06	-6,89E+04
Ensembles	3,11E+06	1,50E+06	7,38E+03	8,27E+01	1,63E+06	-2,69E+04	1,70E+06	8,17E+05	4,03E+03	4,52E+01	8,91E+05	-1,47E+04	6,59E+05	3,13E+05	1,58E+03	1,78E+01	3,50E+05	-5,77E+03
Costumes	4,29E+05	2,19E+05	9,60E+02	1,08E+01	2,12E+05	-3,50E+03	1,69E+05	8,33E+04	3,92E+02	4,39E+00	8,66E+04	-1,43E+03	3,51E+04	1,68E+04	8,37E+01	9,39E-01	1,85E+04	-3,05E+02
Dresses	3,63E+06	2,85E+06	9,79E+03	1,10E+02	8,11E+05	-3,56E+04	5,68E+06	4,44E+06	1,54E+04	1,73E+02	1,28E+06	-5,62E+04	9,50E+06	7,50E+06	2,49E+04	2,80E+02	2,07E+06	-9,08E+04
Skirts	4,73E+06	2,90E+06	1,41E+04	1,58E+02	1,87E+06	-5,14E+04	9,37E+06	5,68E+06	2,84E+04	3,19E+02	3,77E+06	-1,03E+05	9,28E+06	5,68E+06	2,77E+04	3,11E+02	3,68E+06	-1,01E+05
Tracksuits an	7,41E+06	5,85E+06	2,45E+04	2,75E+02	1,62E+06	-8,91E+04	9,38E+06	7,40E+06	3,11E+04	3,49E+02	2,06E+06	-1,13E+05	5,50E+06	4,39E+06	1,73E+04	1,94E+02	1,15E+06	-6,31E+04
Gloves	2,42E+06	2,20E+06	1,12E+04	1,26E+02	2,48E+05	-4,08E+04	2,90E+06	2,63E+06	1,35E+04	1,52E+02	2,99E+05	-4,93E+04	4,98E+06	4,53E+06	2,32E+04	2,60E+02	5,12E+05	-8,44E+04
Handkerchief	3,27E+04	3,31E+04	1,66E+02	1,86E+00	0,00E+00	-6,05E+02	3,43E+04	3,47E+04	1,74E+02	1,95E+00	0,00E+00	-6,34E+02	2,97E+04	3,01E+04	1,52E+02	1,70E+00	0,00E+00	-5,53E+02
Scarves	7,62E+05	5,90E+05	2,70E+03	3,03E+01	1,79E+05	-9,83E+03	1,74E+06	1,31E+06	6,75E+03	7,57E+01	4,47E+05	-2,46E+04	2,07E+06	1,56E+06	8,03E+03	9,01E+01	5,32E+05	-2,92E+04
Ties	2,04E+05	2,07E+05	1,06E+03	1,19E+01	0,00E+00	-3,87E+03	4,32E+05	4,38E+05	2,25E+03	2,52E+01	0,00E+00	-8,19E+03	3,16E+05	3,20E+05	1,64E+03	1,84E+01	0,00E+00	-5,98E+03
Bed linens	7,38E+06	2,35E+06	1,15E+04	1,29E+02	5,07E+06	-4,17E+04	1,21E+07	3,83E+06	1,87E+04	2,10E+02	8,27E+06	-6,81E+04	6,34E+06	2,13E+06	9,57E+03	1,07E+02	4,23E+06	-3,48E+04
Towels	5,82E+07	1,58E+07	7,72E+04	8,66E+02	4,27E+07	-2,81E+05	1,03E+08	2,80E+07	1,37E+05	1,53E+03	7,55E+07	-4,98E+05	9,79E+07	2,68E+07	1,29E+05	1,45E+03	7,14E+07	-4,70E+05
Table linens	7,98E+06	4,77E+06	2,37E+04	2,66E+02	3,28E+06	-8,64E+04	1,36E+07	8,14E+06	4,05E+04	4,55E+02	5,60E+06	-1,48E+05	1,13E+07	6,74E+06	3,35E+04	3,75E+02	4,62E+06	-1,22E+05
Curtains	3,60E+06	2,33E+06	1,18E+04	1,32E+02	1,30E+06	-4,29E+04	1,57E+07	1,01E+07	5,13E+04	5,75E+02	5,67E+06	-1,87E+05	1,36E+07	8,78E+06	4,47E+04	5,02E+02	4,94E+06	-1,63E+05
Floor coverin	4,06E+07	3,73E+07	1,34E+05	1,50E+03	3,69E+06	-4,87E+05	5,16E+07	4,74E+07	1,69E+05	1,89E+03	4,67E+06	-6,15E+05	5,37E+07	4,91E+07	1,85E+05	2,08E+03	5,12E+06	-6,75E+05
TOTALT	3,91E+08	2,00E+08	8,30E+05	9,31E+03	1,93E+08	-3,02E+06	5,17E+08	2,56E+08	1,10E+06	1,24E+04	2,63E+08	-4,01E+06	4,89E+08	2,46E+08	1,06E+06	1,18E+04	2,45E+08	-3,84E+06

Table B3e CML2001 - Apr. 2013, Terrestric Ecotoxicity Potential (TETP inf.) [kg DCB-Equiv.]

Products	2000 Total	2000 Productior	2000 Transport	2000 Transport	2000 Use phase	2000 Waste management	2007 Total	2007 Productior	2007 Transport	2007 Transport	2007 Use phase	2007 Waste management	2013 Total	2013 Productior	2013 Transport	2013 Transport	2013 Use phase	2013 Waste management
Shirts	4,76E+06	4,45E+06	1,79E+02	1,21E+02	3,40E+05	-2,78E+04	5,96E+06	5,61E+06	1,99E+02	1,34E+02	3,79E+05	-3,10E+04	4,90E+06	4,59E+06	1,78E+02	1,20E+02	3,39E+05	-2,77E+04
Jumpers	6,86E+06	6,37E+06	2,81E+02	1,89E+02	5,34E+05	-4,37E+04	7,44E+06	6,94E+06	2,91E+02	1,96E+02	5,53E+05	-4,52E+04	6,98E+06	6,44E+06	3,14E+02	2,12E+02	5,96E+05	-4,88E+04

T-shirts	1,04E+07	1,02E+07	3,02E+02	2,04E+02	2,87E+05	-4,70E+04	1,18E+07	1,15E+07	3,41E+02	2,30E+02	3,24E+05	-5,30E+04	9,26E+06	9,04E+06	2,73E+02	1,84E+02	2,59E+05	-4,25E+04
Trousers	3,68E+06	3,35E+06	1,38E+02	9,30E+01	3,51E+05	-2,14E+04	6,72E+06	6,20E+06	2,17E+02	1,47E+02	5,53E+05	-3,38E+04	6,02E+06	5,57E+06	1,91E+02	1,29E+02	4,86E+05	-2,97E+04
Jackets	3,87E+06	3,59E+06	4,53E+02	3,06E+02	3,44E+05	-7,05E+04	7,55E+06	7,22E+06	5,51E+02	3,72E+02	4,19E+05	-8,57E+04	6,68E+06	6,36E+06	5,30E+02	3,57E+02	4,03E+05	-8,24E+04
Negligees an	8,07E+05	7,85E+05	2,87E+01	1,94E+01	2,62E+04	-4,47E+03	8,31E+05	8,10E+05	2,81E+01	1,89E+01	2,56E+04	-4,36E+03	7,83E+05	7,58E+05	3,30E+01	2,23E+01	3,01E+04	-5,13E+03
Nightdresses	9,03E+05	8,50E+05	2,95E+01	1,99E+01	5,83E+04	-4,59E+03	9,53E+05	8,99E+05	2,93E+01	1,98E+01	5,79E+04	-4,56E+03	7,44E+05	6,99E+05	2,48E+01	1,67E+01	4,89E+04	-3,85E+03
Socks, Briefs,	6,91E+06	5,85E+06	2,80E+02	1,89E+02	1,10E+06	-4,35E+04	1,26E+07	1,13E+07	3,43E+02	2,32E+02	1,36E+06	-5,34E+04	1,19E+07	1,06E+07	3,31E+02	2,23E+02	1,31E+06	-5,14E+04
Slips, Pettico	1,29E+03	9,83E+02	2,23E-01	1,50E-01	3,39E+02	-3,46E+01	4,77E+04	4,51E+04	1,88E+00	1,27E+00	2,86E+03	-2,93E+02	8,26E+03	6,98E+03	9,37E-01	6,32E-01	1,42E+03	-1,46E+02
Suits	7,55E+04	5,76E+04	1,31E+01	8,83E+00	1,99E+04	-2,04E+03	4,14E+04	3,13E+04	7,38E+00	4,98E+00	1,12E+04	-1,15E+03	1,69E+04	1,25E+04	3,23E+00	2,18E+00	4,90E+03	-5,02E+02
Blazers	9,72E+05	8,74E+05	7,17E+01	4,84E+01	1,09E+05	-1,12E+04	1,17E+06	1,09E+06	6,44E+01	4,35E+01	9,79E+04	-1,00E+04	1,00E+06	9,09E+05	6,72E+01	4,53E+01	1,02E+05	-1,04E+04
Ensembles	4,88E+05	4,52E+05	2,62E+01	1,77E+01	3,98E+04	-4,07E+03	3,54E+05	3,34E+05	1,43E+01	9,66E+00	2,18E+04	-2,23E+03	8,61E+04	7,84E+04	5,62E+00	3,79E+00	8,54E+03	-8,74E+02
Costumes	4,35E+04	3,88E+04	3,41E+00	2,30E+00	5,18E+03	-5,30E+02	2,59E+04	2,40E+04	1,39E+00	9,38E-01	2,11E+03	-2,16E+02	1,08E+04	1,04E+04	2,97E-01	2,00E-01	4,51E+02	-4,62E+01
Dresses	5,17E+05	5,03E+05	3,47E+01	2,34E+01	1,98E+04	-5,40E+03	1,13E+06	1,11E+06	5,48E+01	3,70E+01	3,12E+04	-8,52E+03	1,37E+06	1,33E+06	8,85E+01	5,97E+01	5,05E+04	-1,38E+04
Skirts	7,97E+05	7,59E+05	5,01E+01	3,38E+01	4,57E+04	-7,79E+03	3,26E+06	3,19E+06	1,01E+02	6,81E+01	9,20E+04	-1,57E+04	3,18E+06	3,11E+06	9,84E+01	6,64E+01	8,98E+04	-1,53E+04
Tracksuits an	1,44E+06	1,42E+06	8,69E+01	5,86E+01	3,96E+04	-1,35E+04	1,63E+06	1,60E+06	1,10E+02	7,44E+01	5,03E+04	-1,72E+04	9,12E+05	8,94E+05	6,15E+01	4,15E+01	2,81E+04	-9,57E+03
Gloves	6,64E+05	6,64E+05	3,98E+01	2,68E+01	6,05E+03	-6,19E+03	6,10E+05	6,10E+05	4,80E+01	3,24E+01	7,30E+03	-7,47E+03	1,17E+06	1,17E+06	8,23E+01	5,55E+01	1,25E+04	-1,28E+04
Handkerchief	1,69E+04	1,70E+04	5,90E-01	3,98E-01	0,00E+00	-9,17E+01	1,81E+04	1,82E+04	6,18E-01	4,17E-01	0,00E+00	-9,62E+01	1,33E+04	1,34E+04	5,39E-01	3,64E-01	0,00E+00	-8,38E+01
Scarves	1,23E+05	1,20E+05	9,58E+00	6,46E+00	4,37E+03	-1,49E+03	2,39E+05	2,31E+05	2,39E+01	1,62E+01	1,09E+04	-3,72E+03	3,20E+05	3,11E+05	2,85E+01	1,92E+01	1,30E+04	-4,43E+03
Ties	4,41E+04	4,47E+04	3,78E+00	2,55E+00	0,00E+00	-5,87E+02	8,60E+04	8,72E+04	7,99E+00	5,39E+00	0,00E+00	-1,24E+03	6,99E+04	7,08E+04	5,83E+00	3,94E+00	0,00E+00	-9,07E+02
Bed linens	1,44E+06	1,32E+06	4,07E+01	2,74E+01	1,24E+05	-6,33E+03	2,29E+06	2,10E+06	6,64E+01	4,48E+01	2,02E+05	-1,03E+04	1,01E+06	9,17E+05	3,40E+01	2,29E+01	1,03E+05	-5,28E+03
Towels	9,32E+06	8,32E+06	2,74E+02	1,85E+02	1,04E+06	-4,26E+04	1,62E+07	1,44E+07	4,85E+02	3,27E+02	1,84E+06	-7,54E+04	1,29E+07	1,13E+07	4,59E+02	3,09E+02	1,74E+06	-7,13E+04
Table linens	3,00E+06	2,93E+06	8,42E+01	5,68E+01	8,00E+04	-1,31E+04	5,11E+06	5,00E+06	1,44E+02	9,70E+01	1,37E+05	-2,24E+04	4,18E+06	4,08E+06	1,19E+02	8,01E+01	1,13E+05	-1,85E+04
Curtains	1,06E+06	1,04E+06	4,18E+01	2,82E+01	3,18E+04	-6,50E+03	4,26E+06	4,15E+06	1,82E+02	1,23E+02	1,38E+05	-2,83E+04	2,75E+06	2,65E+06	1,59E+02	1,07E+02	1,21E+05	-2,47E+04
Floor coverin	4,15E+06	4,14E+06	4,75E+02	3,20E+02	9,02E+04	-7,38E+04	5,47E+06	5,45E+06	5,99E+02	4,04E+02	1,14E+05	-9,32E+04	4,56E+06	4,53E+06	6,57E+02	4,44E+02	1,25E+05	-1,02E+05
TOTAL	5,82E+07	5,40E+07	2,47E+03	1,67E+03	4,61E+06	-3,84E+05	9,03E+07	8,45E+07	3,31E+03	2,24E+03	6,31E+06	-5,15E+05	7,63E+07	7,09E+07	3,09E+03	2,08E+03	5,86E+06	-4,80E+05

Table B3f: Primary energy demand from ren. and non ren. resources (net cal. value) [MJ]

Products		2000 Total	2000 Productio	2000 Transport	2000 Transport	2000 Use phase	2000 Waste managem ent	2007 Total	2007 Productior	2007 Transport	2007 Transport	2007 Use phase	2007 Waste managem ent	2013 Total	2013 Productior	2013 Transport	2013 Transport	2013 Use phase	2013 Waste managem ent
Shirts	Total	5,09E+09	2,56E+09	1,77E+07	2,37E+05	2,57E+09	-5,98E+07	4,27E+16	2,76E+09	1,97E+07	2,64E+05	2,86E+09	-6,66E+07	5,05E+09	2,54E+09	1,76E+07	2,37E+05	2,56E+09	-5,96E+07
	Non renewable	3,48E+09	1,90E+09	1,76E+07	2,25E+05	1,60E+09	-2,82E+07	3,77E+09	2,00E+09	1,97E+07	2,50E+05	1,78E+09	-3,15E+07	3,45E+09	1,87E+09	1,76E+07	2,24E+05	1,59E+09	-2,81E+07
	Renewable	1,60E+09	6,63E+08	3,46E+04	1,26E+04	9,71E+08	-3,16E+07	1,80E+09	7,55E+08	3,85E+04	1,40E+04	1,08E+09	-3,52E+07	1,60E+09	6,65E+08	3,45E+04	1,25E+04	9,67E+08	-3,15E+07
Jumpers	Total	8,05E+09	4,08E+09	2,78E+07	3,73E+05	4,03E+09	-9,39E+07	8,28E+09	4,17E+09	2,88E+07	3,86E+05	4,18E+09	-9,73E+07	9,08E+09	4,65E+09	3,10E+07	4,16E+05	4,50E+09	-1,05E+08
	Non renewable	5,52E+09	3,03E+09	2,77E+07	3,53E+05	2,51E+09	-4,43E+07	5,61E+09	3,02E+09	2,87E+07	3,66E+05	2,60E+09	-4,59E+07	6,25E+09	3,47E+09	3,09E+07	3,94E+05	2,80E+09	-4,95E+07
	Renewable	2,53E+09	1,05E+09	5,43E+04	1,97E+04	1,52E+09	-4,96E+07	2,67E+09	1,15E+09	5,63E+04	2,04E+04	1,58E+09	-5,13E+07	2,82E+09	1,18E+09	6,07E+04	2,20E+04	1,70E+09	-5,54E+07
Tshirts	Total	6,08E+09	3,98E+09	2,99E+07	4,01E+05	2,17E+09	-1,01E+08	6,88E+09	4,51E+09	3,37E+07	4,52E+05	2,45E+09	-1,14E+08	5,51E+09	3,61E+09	2,70E+07	3,62E+05	1,96E+09	-9,13E+07
	Non renewable	4,10E+09	2,77E+09	2,98E+07	3,80E+05	1,35E+09	-4,77E+07	4,63E+09	3,13E+09	3,36E+07	4,28E+05	1,52E+09	-5,38E+07	3,72E+09	2,52E+09	2,69E+07	3,43E+05	1,22E+09	-4,31E+07
	Renewable	1,98E+09	1,21E+09	5,85E+04	2,12E+04	8,20E+08	-5,34E+07	2,25E+09	1,38E+09	6,59E+04	2,39E+04	9,24E+08	-6,01E+07	1,79E+09	1,09E+09	5,28E+04	1,92E+04	7,41E+08	-4,82E+07
Trousers	Total	4,58E+09	1,96E+09	1,36E+07	1,83E+05	2,65E+09	-4,61E+07	7,11E+09	2,98E+09	2,15E+07	2,88E+05	4,18E+09	-7,26E+07	6,23E+09	2,60E+09	1,89E+07	2,53E+05	3,67E+09	-6,38E+07
	Non renewable	3,15E+09	1,51E+09	1,36E+07	1,73E+05	1,65E+09	-2,18E+07	4,79E+09	2,20E+09	2,14E+07	2,73E+05	2,60E+09	-3,43E+07	4,18E+09	1,91E+09	1,88E+07	2,40E+05	2,28E+09	-3,01E+07
	Renewable	1,43E+09	4,55E+08	2,67E+04	9,67E+03	1,00E+09	-2,43E+07	2,32E+09	7,82E+08	4,20E+04	1,52E+04	1,58E+09	-3,83E+07	2,05E+09	6,94E+08	3,69E+04	1,34E+04	1,39E+09	-3,37E+07
Jackets	Total	9,89E+09	7,39E+09	4,48E+07	6,01E+05	2,60E+09	-1,51E+08	1,16E+10	8,61E+09	5,45E+07	7,31E+05	3,17E+09	-1,84E+08	1,14E+10	8,45E+09	5,24E+07	7,03E+05	3,04E+09	-1,77E+08
	Non renewable	7,44E+09	5,85E+09	4,47E+07	5,70E+05	1,62E+09	-7,15E+07	8,55E+09	6,61E+09	5,44E+07	6,93E+05	1,97E+09	-8,70E+07	8,54E+09	6,67E+09	5,23E+07	6,66E+05	1,89E+09	-8,36E+07
	Renewable	2,44E+09	1,54E+09	8,76E+04	3,18E+04	9,83E+08	-8,00E+07	3,10E+09	2,00E+09	1,07E+05	3,87E+04	1,20E+09	-9,73E+07	2,83E+09	1,77E+09	1,02E+05	3,72E+04	1,15E+09	-9,35E+07
	Total	5,96E+08	4,05E+08	2,84E+06	3,81E+04	1,98E+08	-9,60E+06	5,77E+08	3,90E+08	2,77E+06	3,72E+04	1,93E+08	-9,38E+06	6,98E+08	4,79E+08	3,26E+06	4,38E+04	2,27E+08	-1,10E+07
Negligeees,	Non renewable	4,17E+08	2,96E+08	2,83E+06	3,61E+04	1,23E+08	-4,53E+06	4,01E+08	2,82E+08	2,77E+06	3,53E+04	1,20E+08	-4,43E+06	5,00E+08	3,60E+08	3,26E+06	4,15E+04	1,42E+08	-5,21E+06
bathrobes	Renewable	1,78E+08	1,09E+08	5,55E+03	2,01E+03	7,48E+07	-5,07E+06	1,76E+08	1,08E+08	5,43E+03	1,97E+03	7,31E+07	-4,95E+06	1,99E+08	1,18E+08	6,38E+03	2,31E+03	8,59E+07	-5,82E+06
	Total	8,39E+08	4,05E+08	2,92E+06	3,92E+04	4,41E+08	-9,86E+06	8,29E+08	3,98E+08	2,90E+06	3,89E+04	4,38E+08	-9,80E+06	7,08E+08	3,44E+08	2,45E+06	3,29E+04	3,70E+08	-8,28E+06
Nightdresse	Non renewable	5,65E+08	2,92E+08	2,91E+06	3,71E+04	2,74E+08	-4,66E+06	5,54E+08	2,83E+08	2,89E+06	3,69E+04	2,72E+08	-4,63E+06	4,79E+08	2,50E+08	2,44E+06	3,11E+04	2,30E+08	-3,91E+06
s, pyjamas	Renewable	2,74E+08	1,13E+08	5,71E+03	2,07E+03	1,66E+08	-5,21E+06	2,75E+08	1,15E+08	5,67E+03	2,06E+03	1,65E+08	-5,18E+06	2,29E+08	9,39E+07	4,79E+03	1,74E+03	1,40E+08	-4,37E+06
Socks,	Total	1,25E+10	4,18E+09	2,76E+07	3,71E+05	8,35E+09	-9,35E+07	1,47E+10	4,56E+09	3,40E+07	4,56E+05	1,03E+10	-1,15E+08	1,42E+10	4,42E+09	3,27E+07	4,39E+05	9,88E+09	-1,11E+08
Briefs,	Non renewable	8,36E+09	3,18E+09	2,76E+07	3,51E+05	5,20E+09	-4,41E+07	9,57E+09	3,21E+09	3,39E+07	4,32E+05	6,38E+09	-5,42E+07	9,24E+09	3,11E+09	3,26E+07	4,16E+05	6,15E+09	-5,22E+07
panties	Renewable	4,10E+09	9,94E+08	5,41E+04	1,96E+04	3,16E+09	-4,93E+07	5,17E+09	1,36E+09	6,64E+04	2,41E+04	3,88E+09	-6,06E+07	4,98E+09	1,31E+09	6,40E+04	2,32E+04	3,73E+09	-5,84E+07
Slips and	Total	6,30E+06	3,80E+06	2,20E+04	2,96E+02	2,56E+06	-7,45E+04	4,84E+07	2,72E+07	1,86E+05	2,50E+03	2,16E+07	-6,30E+05	2,61E+07	1,56E+07	9,26E+04	1,24E+03	1,08E+07	-3,13E+05
petticoats	Non renewable	4,72E+06	3,14E+06	2,20E+04	2,80E+02	1,59E+06	-3,52E+04	3,37E+07	2,03E+07	1,86E+05	2,37E+03	1,35E+07	-2,97E+05	1,94E+07	1,27E+07	9,24E+04	1,18E+03	6,70E+06	-1,48E+05
	Renewable	1,58E+06	6,57E+05	4,31E+01	1,56E+01	9,67E+05	-3,93E+04	1,47E+07	6,88E+06	3,64E+02	1,32E+02	8,17E+06	-3,32E+05	6,76E+06	2,86E+06	1,81E+02	6,57E+01	4,07E+06	-1,65E+05
Suits	Total	3,56E+08	2,09E+08	1,29E+06	1,74E+04	1,50E+08	-4,38E+06	2,00E+08	1,16E+08	7,30E+05	9,80E+03	8,48E+07	-2,47E+06	8,73E+07	5,10E+07	3,19E+05	4,28E+03	3,71E+07	-1,08E+06
	Non renewable	2,44E+08	1,51E+08	1,29E+06	1,65E+04	9,35E+07	-2,07E+06	1,33E+08	8,03E+07	7,28E+05	9,28E+03	5,28E+07	-1,16E+06	5,70E+07	3,41E+07	3,18E+05	4,06E+03	2,31E+07	-5,09E+05
	Renewable	1,13E+08	5,80E+07	2,53E+03	9,18E+02	5,68E+07	-2,31E+06	6,69E+07	3,62E+07	1,43E+03	5,18E+02	3,20E+07	-1,30E+06	3,03E+07	1,69E+07	6,24E+02	2,26E+02	1,40E+07	-5,69E+05
Blazers	Total	1,91E+09	1,11E+09	7,09E+06	9,52E+04	8,24E+08	-2,40E+07	1,69E+09	9,64E+08	6,37E+06	8,55E+04	7,40E+08	-2,15E+07	1,79E+09	1,03E+09	6,64E+06	8,92E+04	7,72E+08	-2,25E+07
	Non renewable	1,38E+09	8,71E+08	7,08E+06	9,02E+04	5,13E+08	-1,13E+07	1,21E+09	7,54E+08	6,36E+06	8,10E+04	4,61E+08	-1,02E+07	1,30E+09	8,27E+08	6,63E+06	8,45E+04	4,80E+08	-1,06E+07
	Renewable	5,36E+08	2,37E+08	1,39E+04	5,03E+03	3,11E+08	-1,27E+07	4,79E+08	2,10E+08	1,25E+04	4,52E+03	2,80E+08	-1,14E+07	4,84E+08	2,04E+08	1,30E+04	4,71E+03	2,92E+08	-1,19E+07
Ensembles	Total	6,87E+08	3,92E+08	2,59E+06	3,47E+04	3,01E+08	-8,75E+06	3,66E+08	2,05E+08	1,41E+06	1,90E+04	1,64E+08	-4,78E+06	1,50E+08	8,66E+07	5,56E+05	7,46E+03	6,46E+07	-1,88E+06
	Non renewable	5,01E+08	3,16E+08	2,58E+06	3,29E+04	1,87E+08	-4,13E+06	2,59E+08	1,57E+08	1,41E+06	1,80E+04	1,02E+08	-2,26E+06	1,12E+08	7,18E+07	5,55E+05	7,06E+03	4,02E+07	-8,87E+05
	Renewable	1,86E+08	7,68E+07	5,06E+03	1,84E+03	1,14E+08	-4,62E+06	1,07E+08	4,75E+07	2,77E+03	1,00E+03	6,21E+07	-2,53E+06	3,82E+07	1,48E+07	1,09E+03	3,94E+02	2,44E+07	-9,92E+05
Costumes	Total	9,17E+07	5,34E+07	3,37E+05	4,52E+03	3,92E+07	-1,14E+06	3,65E+07	2,08E+07	1,37E+05	1,85E+03	1,60E+07	-4,65E+05	7,20E+06	3,86E+06	2,94E+04	3,94E+02	3,41E+06	-9,93E+04
	Non renewable	6,74E+07	4,32E+07	3,36E+05	4,28E+03	2,44E+07	-5,38E+05	2,64E+07	1,65E+07	1,37E+05	1,75E+03	9,94E+06	-2,19E+05	4,77E+06	2,66E+06	2,93E+04	3,73E+02	2,12E+06	-4,69E+04
	Renewable	2,43E+07	1,01E+07	6,59E+02	2,39E+02	1,48E+07	-6,01E+05	1,01E+07	4,30E+06	2,69E+02	9,75E+01	6,03E+06	-2,45E+05	2,44E+06	1,20E+06	5,74E+01	2,08E+01	1,29E+06	-5,24E+04
Dresses	Total	6,94E+08	5,52E+08	3,43E+06	4,61E+04	1,50E+08	-1,16E+07	1,06E+09	8,33E+08	5,41E+06	7,27E+04	2,36E+08	-1,83E+07	1,77E+09	1,41E+09	8,75E+06	1,17E+05	3,81E+08	-2,96E+07
	Non renewable	5,15E+08	4,24E+08	3,43E+06	4,37E+04	9,31E+07	-5,48E+06	7,55E+08	6,11E+08	5,40E+06	6,88E+04	1,47E+08	-8,64E+06	1,30E+09	1,07E+09	8,73E+06	1,11E+05	2,37E+08	-1,40E+07
	Renewable	1,79E+08	1,28E+08	6,72E+03	2,44E+03	5,66E+07	-6,13E+06	3,01E+08	2,22E+08	1,06E+04	3,84E+03	8,91E+07	-9,67E+06	4,69E+08	3,40E+08	1,71E+04	6,21E+03	1,44E+08	-1,56E+07
Skirts	Total	1,10E+09	7,69E+08	4,95E+06	6,65E+04	3,45E+08	-1,68E+07	2,02E+09	1,35E+09	9,97E+06	1,34E+05	6,95E+08	-3,37E+07	1,98E+09	1,32E+09	9,73E+06	1,31E+05	6,79E+08	-3,29E+07
	Non renewable	8,42E+08	6,30E+08	4,94E+06	6,30E+04	2,15E+08	-7,91E+06	1,39E+09	9,66E+08	9,95E+06	1,27E+05	4,33E+08	-1,59E+07	1,36E+09	9,41E+08	9,71E+06	1,24E+05	4,22E+08	-1,55E+07

	Renewable	2,61E+08	1,39E+08	9,69E+03	3,52E+03	1,30E+08	-8,84E+06	6,29E+08	3,84E+08	1,95E+04	7,08E+03	2,63E+08	-1,78E+07	6,19E+08	3,80E+08	1,90E+04	6,91E+03	2,56E+08	-1,74E+07
Tracksuits skisuits	Total	1,62E+09	1,34E+09	8,59E+06	1,15E+05	2,99E+08	-2,90E+07	2,07E+09	1,71E+09	1,09E+07	1,46E+05	3,80E+08	-3,69E+07	1,17E+09	9,70E+08	6,08E+06	8,17E+04	2,12E+08	-2,06E+07
	Non renewable	1,24E+09	1,06E+09	8,57E+06	1,09E+05	1,86E+08	-1,37E+07	1,60E+09	1,37E+09	1,09E+07	1,39E+05	2,37E+08	-1,74E+07	8,97E+08	7,68E+08	6,07E+06	7,74E+04	1,32E+08	-9,71E+06
	Renewable	3,79E+08	2,81E+08	1,68E+04	6,10E+03	1,13E+08	-1,53E+07	4,67E+08	3,43E+08	2,13E+04	7,74E+03	1,44E+08	-1,95E+07	2,71E+08	2,01E+08	1,19E+04	4,32E+03	8,01E+07	-1,09E+07
Gloves	Total	6,38E+08	6,01E+08	3,93E+06	5,28E+04	4,57E+07	-1,33E+07	7,87E+08	7,43E+08	4,75E+06	6,37E+04	5,52E+07	-1,61E+07	1,34E+09	1,27E+09	8,14E+06	1,09E+05	9,45E+07	-2,75E+07
	Non renewable	5,17E+08	4,91E+08	3,93E+06	5,00E+04	2,84E+07	-6,28E+06	6,55E+08	6,23E+08	4,74E+06	6,04E+04	3,43E+07	-7,58E+06	1,11E+09	1,05E+09	8,12E+06	1,03E+05	5,88E+07	-1,30E+07
	Renewable	1,21E+08	1,10E+08	7,70E+03	2,79E+03	1,73E+07	-7,02E+06	1,32E+08	1,20E+08	9,29E+03	3,37E+03	2,08E+07	-8,47E+06	2,36E+08	2,15E+08	1,59E+04	5,77E+03	3,57E+07	-1,45E+07
Handkerchiefs	Total	7,95E+06	8,09E+06	5,83E+04	7,82E+02	0,00E+00	-1,97E+05	8,28E+06	8,43E+06	6,11E+04	8,21E+02	0,00E+00	-2,07E+05	7,50E+06	7,62E+06	5,33E+04	7,15E+02	0,00E+00	-1,80E+05
	Non renewable	5,92E+06	5,95E+06	5,82E+04	7,41E+02	0,00E+00	-9,30E+04	6,13E+06	6,16E+06	6,10E+04	7,77E+02	0,00E+00	-9,76E+04	5,79E+06	5,82E+06	5,32E+04	6,77E+02	0,00E+00	-8,51E+04
	Renewable	2,03E+06	2,13E+06	1,14E+02	4,14E+01	0,00E+00	-1,04E+05	2,16E+06	2,26E+06	1,20E+02	4,34E+01	0,00E+00	-1,09E+05	1,71E+06	1,80E+06	1,04E+02	3,78E+01	0,00E+00	-9,51E+04
Scarves	Total	1,84E+08	1,54E+08	9,47E+05	1,27E+04	3,30E+07	-3,20E+06	4,56E+08	3,79E+08	2,37E+06	3,18E+04	8,25E+07	-8,01E+06	5,41E+08	4,49E+08	2,82E+06	3,78E+04	9,82E+07	-9,53E+06
	Non renewable	1,47E+08	1,27E+08	9,45E+05	1,20E+04	2,05E+07	-1,51E+06	3,75E+08	3,25E+08	2,36E+06	3,01E+04	5,14E+07	-3,78E+06	4,41E+08	3,81E+08	2,81E+06	3,58E+04	6,11E+07	-4,50E+06
	Renewable	3,70E+07	2,62E+07	1,85E+03	6,72E+02	1,25E+07	-1,69E+06	8,18E+07	5,48E+07	4,63E+03	1,68E+03	3,12E+07	-4,23E+06	9,98E+07	6,77E+07	5,51E+03	2,00E+03	3,71E+07	-5,03E+06
Ties	Total	5,82E+07	5,91E+07	3,73E+05	5,01E+03	0,00E+00	-1,26E+06	1,24E+08	1,26E+08	7,90E+05	1,06E+04	0,00E+00	-2,67E+06	8,98E+07	9,11E+07	5,77E+05	7,74E+03	0,00E+00	-1,95E+06
	Non renewable	4,97E+07	4,99E+07	3,72E+05	4,75E+03	0,00E+00	-5,96E+05	1,06E+08	1,07E+08	7,88E+05	1,00E+04	0,00E+00	-1,26E+06	7,64E+07	7,68E+07	5,75E+05	7,33E+03	0,00E+00	-9,21E+05
	Renewable	8,54E+06	9,21E+06	7,30E+02	2,65E+02	0,00E+00	-6,66E+05	1,76E+07	1,90E+07	1,54E+03	5,60E+02	0,00E+00	-1,41E+06	1,33E+07	1,44E+07	1,13E+03	4,09E+02	0,00E+00	-1,03E+06
Bed linens	Total	1,47E+09	5,41E+08	4,02E+06	5,40E+04	9,35E+08	-1,36E+07	2,40E+09	8,91E+08	6,56E+06	8,81E+04	1,53E+09	-2,22E+07	1,25E+09	4,77E+08	3,36E+06	4,51E+04	7,80E+08	-1,14E+07
	Non renewable	9,61E+08	3,82E+08	4,01E+06	5,11E+04	5,82E+08	-6,42E+06	1,58E+09	6,35E+08	6,55E+06	8,35E+04	9,49E+08	-1,05E+07	8,33E+08	3,50E+08	3,35E+06	4,27E+04	4,86E+08	-5,36E+06
	Renewable	5,06E+08	1,60E+08	7,87E+03	2,85E+03	3,53E+08	-7,18E+06	8,21E+08	2,56E+08	1,28E+04	4,66E+03	5,76E+08	-1,17E+07	4,17E+08	1,28E+08	6,57E+03	2,38E+03	2,95E+08	-5,99E+06
Towels	Total	1,15E+10	3,71E+09	2,71E+07	3,64E+05	7,87E+09	-9,16E+07	2,05E+10	6,64E+09	4,79E+07	6,44E+05	1,39E+10	-1,62E+08	1,96E+10	6,53E+09	4,53E+07	6,09E+05	1,32E+10	-1,53E+08
	Non renewable	7,56E+09	2,68E+09	2,70E+07	3,44E+05	4,90E+09	-4,32E+07	1,35E+10	4,83E+09	4,78E+07	6,10E+05	8,67E+09	-7,65E+07	1,31E+10	4,96E+09	4,52E+07	5,76E+05	8,19E+09	-7,24E+07
	Renewable	3,96E+09	1,04E+09	5,30E+04	1,92E+04	2,97E+09	-4,84E+07	6,99E+09	1,81E+09	9,38E+04	3,40E+04	5,26E+09	-8,56E+07	6,47E+09	1,57E+09	8,87E+04	3,22E+04	4,98E+09	-8,09E+07
Table linens	Total	1,68E+09	1,10E+09	8,32E+06	1,12E+05	6,04E+08	-2,81E+07	2,87E+09	1,87E+09	1,42E+07	1,91E+05	1,03E+09	-4,81E+07	2,38E+09	1,55E+09	1,17E+07	1,58E+05	8,53E+08	-3,97E+07
	Non renewable	1,13E+09	7,56E+08	8,30E+06	1,06E+05	3,76E+08	-1,33E+07	1,93E+09	1,29E+09	1,42E+07	1,81E+05	6,42E+08	-2,27E+07	1,60E+09	1,08E+09	1,17E+07	1,49E+05	5,31E+08	-1,87E+07
	Renewable	5,53E+08	3,40E+08	1,63E+04	5,91E+03	2,28E+08	-1,49E+07	9,45E+08	5,80E+08	2,78E+04	1,01E+04	3,90E+08	-2,54E+07	7,78E+08	4,77E+08	2,30E+04	8,33E+03	3,22E+08	-2,10E+07
Curtains	Total	8,19E+08	5,89E+08	4,13E+06	5,55E+04	2,40E+08	-1,40E+07	3,62E+09	2,62E+09	1,80E+07	2,42E+05	1,05E+09	-6,08E+07	3,27E+09	2,40E+09	1,57E+07	2,11E+05	9,12E+08	-5,31E+07
	Non renewable	5,96E+08	4,49E+08	4,12E+06	5,26E+04	1,49E+08	-6,60E+06	2,68E+09	2,04E+09	1,80E+07	2,29E+05	6,50E+08	-2,87E+07	2,52E+09	1,96E+09	1,57E+07	2,00E+05	5,67E+08	-2,51E+07
	Renewable	2,23E+08	1,40E+08	8,09E+03	2,93E+03	9,07E+07	-7,38E+06	9,45E+08	5,82E+08	3,52E+04	1,28E+04	3,95E+08	-3,21E+07	7,57E+08	4,41E+08	3,07E+04	1,11E+04	3,45E+08	-2,80E+07
Floor coverings	Total	8,51E+09	7,94E+09	4,69E+07	6,30E+05	6,82E+08	-1,59E+08	1,06E+10	9,91E+09	5,92E+07	7,95E+05	8,61E+08	-2,00E+08	1,21E+10	1,13E+10	6,50E+07	8,73E+05	9,44E+08	-2,20E+08
	Non renewable	6,71E+09	6,31E+09	4,68E+07	5,97E+05	4,24E+08	-7,49E+07	8,32E+09	7,82E+09	5,91E+07	7,53E+05	5,36E+08	-9,46E+07	9,85E+09	9,30E+09	6,49E+07	8,27E+05	5,88E+08	-1,04E+08
	Renewable	1,80E+09	1,62E+09	9,18E+04	3,33E+04	2,57E+08	-8,38E+07	2,32E+09	2,10E+09	1,16E+05	4,21E+04	3,25E+08	-1,06E+08	2,22E+09	1,98E+09	1,27E+05	4,61E+04	3,57E+08	-1,16E+08
TOTAL	Primary energy demand from ren. and non ren.	7,89E+10	4,41E+10	2,91E+08	3,91E+06	3,55E+10	-9,85E+08	4,27E+16	5,68E+10	3,87E+08	5,19E+06	4,86E+10	-1,31E+09	1,00E+11	5,60E+10	3,70E+08	4,97E+06	4,52E+10	-1,25E+09
	Primary energy from non renewable	5,55E+10	3,36E+10	2,91E+08	3,70E+06	2,21E+10	-4,65E+08	7,24E+10	4,24E+10	3,86E+08	4,92E+06	3,02E+10	-6,17E+08	7,10E+10	4,30E+10	3,69E+08	4,71E+06	2,81E+10	-5,91E+08
	Primary energy from renewable resources	2,34E+10	1,05E+10	5,70E+05	2,07E+05	1,34E+10	-5,20E+08	3,21E+10	1,44E+10	7,57E+05	2,74E+05	1,84E+10	-6,91E+08	2,94E+10	1,30E+10	7,24E+05	2,63E+05	1,71E+10	-6,61E+08

Table B3g Water use and water consumption [kg]

Products		2000 Total	2000 Productior	2000 Transport	2000 Transport	2000 Use phase	2000 Waste managem ent	2007 Total	2007 Productior	2007 Transport	2007 Transport	2007 Use phase	2007 Waste managem ent	2013 Total	2013 Productior	2013 Transport	2013 Transport	2013 Use phase	2013 Waste managem ent
Shirts	Blue water consumption	1,85E+10	1,35E+10	90011,82	22029,48	5,04E+09	-2,5E+07	2,29E+10	1,73E+10	100266,1	24539,12	5,61E+09	-2,8E+07	1,9E+10	1,4E+10	89692,92	21951,43	5,02E+09	-2,5E+07
	Blue water use [kg]	1,55E+12	2,77E+11	40176034	594700,6	1,29E+12	-1,5E+10	1,74E+12	3,2E+11	44752965	662450	1,44E+12	-1,7E+10	1,55E+12	2,76E+11	40033697	592593,7	1,29E+12	-1,5E+10
	Total freshwater consum	7,19E+10	6,64E+10	176915,4	433184	5,65E+09	-2,1E+08	9,2E+10	8,59E+10	197070	482533,2	6,29E+09	-2,3E+08	7,45E+10	6,91E+10	176288,7	431649,3	5,63E+09	-2,1E+08
	Total freshwater use [kg]	1,61E+12	3,3E+11	40262938	1005855	1,29E+12	-1,5E+10	1,81E+12	3,88E+11	44849769	1120444	1,44E+12	-1,7E+10	1,6E+12	3,31E+11	40120292	1002292	1,29E+12	-1,5E+10
Jumpers	Blue water consumption	1,05E+12	3,5E+10	141320,7	34586,81	1,02E+12	-4E+07	1,09E+12	3,24E+10	146381,8	35825,46	1,06E+12	-4,1E+07	1,18E+12	3,9E+10	157810,3	38622,48	1,14E+12	-4,4E+07
	Blue water use [kg]	2,44E+12	4,34E+11	63077331	933694,1	2,03E+12	-2,4E+10	2,52E+12	4,45E+11	65336313	967132,4	2,1E+12	-2,5E+10	2,73E+12	4,85E+11	70437335	1042640	2,27E+12	-2,7E+10
	Total freshwater consum	1,02E+11	9,37E+10	277761,5	680109,2	8,87E+09	-3,3E+08	1,12E+11	1,03E+11	287708,9	704465,9	9,18E+09	-3,4E+08	1,02E+11	9,28E+10	310171,3	759465,9	9,9E+09	-3,6E+08
	Total freshwater use [kg]	2,52E+12	5,08E+11	63213772	1579217	2,03E+12	-2,4E+10	2,61E+12	5,28E+11	65477640	1635773	2,1E+12	-2,5E+10	2,8E+12	5,58E+11	70589696	1763483	2,27E+12	-2,7E+10
T-shirts	Blue water consumption	3,59E+10	3,17E+10	152123	37230,57	4,26E+09	-4,3E+07	4,05E+10	3,58E+10	171455,9	41962,1	4,8E+09	-4,8E+07	3,19E+10	2,81E+10	137413,1	33630,46	3,84E+09	-3,9E+07
	Blue water use [kg]	1,53E+12	4,61E+11	67898861	1005064	1,09E+12	-2,6E+10	1,72E+12	5,2E+11	76527932	1132795	1,23E+12	-2,9E+10	1,38E+12	4,16E+11	61333189	907876,7	9,87E+11	-2,3E+10
	Total freshwater consum	1,64E+11	1,6E+11	298993,1	732095,7	4,77E+09	-3,5E+08	1,85E+11	1,8E+11	336991,3	825135,6	5,38E+09	-3,9E+08	1,45E+11	1,41E+11	270081,1	661303,6	4,31E+09	-3,2E+08
	Total freshwater use [kg]	1,66E+12	5,89E+11	68045731	1699929	1,09E+12	-2,6E+10	1,87E+12	6,64E+11	76693468	1915968	1,23E+12	-3E+10	1,49E+12	5,29E+11	61465858	1535550	9,88E+11	-2,4E+10
Trousers	Blue water consumption	1,52E+10	9,98E+09	69378,37	16979,65	5,2E+09	-1,9E+07	2,71E+10	1,89E+10	109292,5	26748,23	8,19E+09	-3,1E+07	2,42E+10	1,7E+10	96003,24	23495,82	7,2E+09	-2,7E+07
	Blue water use [kg]	1,54E+12	2,16E+11	30966464	458377,1	1,34E+12	-1,2E+10	2,42E+12	3,37E+11	48781812	722086,5	2,1E+12	-1,9E+10	2,13E+12	2,95E+11	42850255	634285,4	1,85E+12	-1,6E+10
	Total freshwater consum	5,53E+10	4,96E+10	136361	333885,1	5,83E+09	-1,6E+08	1,04E+11	9,46E+10	214811	525972,8	9,19E+09	-2,5E+08	9,31E+10	8,52E+10	188691,4	462017,9	8,07E+09	-2,2E+08
	Total freshwater use [kg]	1,58E+12	2,56E+11	31033447	775282,5	1,34E+12	-1,2E+10	2,5E+12	4,12E+11	48887330	1221311	2,11E+12	-1,9E+10	2,2E+12	3,63E+11	42942943	1072807	1,85E+12	-1,7E+10
Jackets	Blue water consumption	1,4E+10	8,95E+09	227980	55795,79	5,1E+09	-6,4E+07	2,66E+10	2,05E+10	277237,8	67851,15	6,2E+09	-7,8E+07	2,32E+10	1,73E+10	266512,7	65226,29	5,96E+09	-7,5E+07
	Blue water use [kg]	1,98E+12	7,11E+11	1,02E+08	1506245	1,31E+12	-3,9E+10	2,4E+12	8,55E+11	1,24E+08	1831687	1,59E+12	-4,7E+10	2,32E+12	8,35E+11	1,19E+08	1760828	1,53E+12	-4,5E+10
	Total freshwater consum	3,87E+10	3,35E+10	448087,6	1097159	5,72E+09	-5,3E+08	9,79E+10	9,16E+10	544902,4	1334214	6,96E+09	-6,4E+08	8,24E+10	7,63E+10	523822,5	1282599	6,69E+09	-6,1E+08
	Total freshwater use [kg]	2,01E+12	7,36E+11	1,02E+08	2547608	1,31E+12	-3,9E+10	2,47E+12	9,26E+11	1,24E+08	3098050	1,59E+12	-4,8E+10	2,38E+12	8,94E+11	1,19E+08	2978200	1,53E+12	-4,6E+10
Negligess a	Blue water consumption	2,78E+09	2,4E+09	14450,56	3536,629	3,88E+08	-4054165	2,86E+09	2,49E+09	14122,18	3456,26	3,79E+08	-3962036	2,72E+09	2,28E+09	16600,59	4062,826	4,46E+08	-4657363
	Blue water use [kg]	1,42E+11	4,44E+10	6449890	95473,67	9,97E+10	-2,5E+09	1,38E+11	4,33E+10	6303319	93304,07	9,74E+10	-2,4E+09	1,63E+11	5,13E+10	7409535	109678,7	1,14E+11	-2,8E+09
	Total freshwater consum	1,23E+10	1,19E+10	28402,13	69543,68	4,35E+08	-3,3E+07	1,28E+10	1,24E+10	27756,71	67963,33	4,25E+08	-3,3E+07	1,16E+10	1,12E+10	32627,94	79890,72	5E+08	-3,8E+07
	Total freshwater use [kg]	1,51E+11	5,39E+10	6463841	161480,7	9,97E+10	-2,5E+09	1,48E+11	5,32E+10	6316953	157811,1	9,74E+10	-2,4E+09	1,72E+11	6,01E+10	7425563	185506,6	1,15E+11	-2,9E+09
Nightdress	Blue water consumption	3,47E+09	2,61E+09	14842,86	3632,639	8,64E+08	-4164225	3,63E+09	2,78E+09	14754,6	3611,039	8,58E+08	-4139464	2,86E+09	2,14E+09	12463,53	3050,323	7,25E+08	-3496695
	Blue water use [kg]	2,65E+11	4,53E+10	6624987	98065,53	2,22E+11	-2,5E+09	2,63E+11	4,49E+10	6585594	97482,41	2,2E+11	-2,5E+09	2,22E+11	3,82E+10	5562995	82345,52	1,86E+11	-2,1E+09
	Total freshwater consum	1,4E+10	1,3E+10	29173,18	71431,61	9,69E+08	-3,4E+07	1,48E+10	1,39E+10	28999,71	71006,86	9,63E+08	-3,4E+07	1,15E+10	1,07E+10	24496,69	59981,05	8,13E+08	-2,9E+07
	Total freshwater use [kg]	2,75E+11	5,57E+10	6639318	165864,5	2,22E+11	-2,6E+09	2,74E+11	5,61E+10	6599839	164878,2	2,21E+11	-2,5E+09	2,31E+11	4,67E+10	5575028	139276,2	1,86E+11	-2,1E+09
Socks, Brie	Blue water consumption	3,37E+10	1,73E+10	140672,1	34428,07	1,64E+10	-3,9E+07	5,5E+10	3,49E+10	172812,9	42294,2	2,01E+10	-4,8E+07	5,23E+10	3,3E+10	166411,7	40727,58	1,94E+10	-4,7E+07
	Blue water use [kg]	4,62E+12	4,37E+11	62787839	929409	4,2E+12	-2,4E+10	5,66E+12	5,25E+11	77133595	1141760	5,16E+12	-2,9E+10	5,45E+12	5,06E+11	74276503	1099468	4,97E+12	-2,8E+10
	Total freshwater consum	1,02E+11	8,41E+10	276486,7	676987,9	1,84E+10	-3,2E+08	1,98E+11	1,76E+11	339658,3	831666	2,26E+10	-4E+08	1,87E+11	1,66E+11	327077,1	800860,4	2,17E+10	-3,8E+08
	Total freshwater use [kg]	4,69E+12	5,04E+11	62923654	1571969	4,21E+12	-2,4E+10	5,8E+12	6,66E+11	77300441	1931132	5,17E+12	-3E+10	5,58E+12	6,38E+11	74437168	1859601	4,98E+12	-2,9E+10
Slips and p	Blue water consumption	6513604	1529262	112,0722	27,42854	5015645	-31442,3	1,78E+08	1,36E+08	947,5411	231,9011	42405958	-265837	36942730	15981509	471,3101	115,3484	21092863	-132228
	Blue water use [kg]	1,63E+09	3,58E+08	50022,51	740,4518	1,29E+09	-1,9E+07	1,37E+10	2,92E+09	422927,2	6260,325	1,09E+10	-1,6E+08	6,84E+09	1,5E+09	210365,4	3113,906	5,42E+09	-8E+07
	Total freshwater consum	7252791	1884947	220,2745	539,3502	5625211	-258127	7,14E+08	6,68E+08	1862,363	4560,064	47559681	-2182393	81204773	58630766	926,3453	2268,191	23656342	-1085529
	Total freshwater use [kg]	1,63E+09	3,58E+08	50130,71	1252,373	1,29E+09	-1,9E+07	1,42E+10	3,45E+09	423842	10588,49	1,09E+10	-1,6E+08	6,88E+09	1,54E+09	210820,4	5266,749	5,42E+09	-8,1E+07
Suits	Blue water consumption	4,48E+08	1,55E+08	6584,918	1611,592	2,95E+08	-1847426	2,6E+08	94703641	3713,593	908,8644	1,66E+08	-1041864	1,13E+08	40500916	1623,433	397,3188	72654625	-455461
	Blue water use [kg]	9,4E+10	1,95E+10	2939124	43506,01	7,57E+10	-1,1E+09	5,28E+10	1,07E+10	1657532	24535,4	4,27E+10	-6,3E+08	2,3E+10	4,63E+09	724606,1	10725,89	1,87E+10	-2,8E+08
	Total freshwater consum	6,05E+08	2,89E+08	12942,45	31690,07	3,31E+08	-1,5E+07	3,48E+08	1,7E+08	7298,953	17871,76	1,86E+08	-8553213	1,37E+08	59214364	3190,808	7812,811	81484559	-3739120
	Total freshwater use [kg]	9,42E+10	1,96E+10	2945482	73584,49	7,57E+10	-1,1E+09	5,29E+10	1,08E+10	1661117	41498,29	4,27E+10	-6,4E+08	2,3E+10	4,65E+09	726173,4	18141,38	1,87E+10	-2,8E+08
Blazers	Blue water consumption	4E+09	2,4E+09	36092,91	8833,375	1,62E+09	-1E+07	4,55E+09	3,11E+09	32420,35	7934,553	1,45E+09	-9095664	3,98E+09	2,47E+09	33804,7	8273,357	1,51E+09	-9484047
	Blue water use [kg]	5,21E+11	1,12E+11	16109774	238462,9	4,15E+11	-6,1E+09	4,68E+11	1,01E+11	14470557	214198,6	3,73E+11	-5,5E+09	4,89E+11	1,06E+11	15088448	223344,8	3,89E+11	-5,7E+09
	Total freshwater consum	1,24E+10	1,07E+10	70939,5	173698	1,81E+09	-8,3E+07	1,64E+10	1,48E+10	63721,2	156023,7	1,63E+09	-7,5E+07	1,31E+10	1,14E+10	66442,08	162685,9	1,7E+09	-7,8E+07
	Total freshwater use [kg]	5,29E+11	1,21E+11	16144621	403327,5	4,15E+11	-6,2E+09	4,8E+11	1,13E+11	14501858	362287,7	3,73E+11	-5,6E+09	4,98E+11	1,15E+11	15121085	377757,4	3,89E+11	-5,8E+09

Ensembles	Blue water consumption	1,86E+09	1,27E+09	13169,16	3223,018	5,89E+08	-3694662	1,31E+09	9,93E+08	7201,296	1762,444	3,22E+08	-2020353	3,33E+08	2,08E+08	2827,995	692,123	1,27E+08	-793406
	Blue water use [kg]	1,91E+11	4,16E+10	5877946	87007,54	1,51E+11	-2,2E+09	1,04E+11	2,24E+10	3214239	47578,36	8,28E+10	-1,2E+09	4,11E+10	9,06E+09	1262252	18684,33	3,25E+10	-4,8E+08
	Total freshwater consum	6,77E+09	6,14E+09	25883,58	63376,89	6,61E+08	-3E+07	5,26E+09	4,91E+09	14153,92	34656,41	3,61E+08	-1,7E+07	1,12E+09	9,82E+08	5558,336	13609,79	1,42E+08	-6513486
	Total freshwater use [kg]	1,96E+11	4,65E+10	5890660	147161,4	1,51E+11	-2,3E+09	1,08E+11	2,64E+10	3221192	80472,32	8,28E+10	-1,2E+09	4,19E+10	9,83E+09	1264982	31601,99	3,25E+10	-4,9E+08
Costumes	Blue water consumption	1,77E+08	1,01E+08	1714,638	419,6402	76736351	-481049	99136637	68027025	699,4952	171,1944	31304987	-196246	38994937	32348949	149,4341	36,57248	6687727	-41924,4
	Blue water use [kg]	2,48E+10	5,42E+09	765314,3	11328,47	1,97E+10	-2,9E+08	1,01E+10	2,2E+09	312213,9	4621,506	8,04E+09	-1,2E+08	2,14E+09	4,52E+08	66698,67	987,2986	1,72E+09	-2,5E+07
	Total freshwater consum	5,33E+08	4,51E+08	3370,067	8251,734	86062349	-3949183	3,6E+08	3,27E+08	1374,836	3366,337	35109576	-1611089	1,7E+08	1,63E+08	293,7081	719,1551	7500506	-344179
	Total freshwater use [kg]	2,52E+10	5,77E+09	766969,8	19160,56	1,97E+10	-3E+08	1,04E+10	2,46E+09	312889,2	7816,649	8,04E+09	-1,2E+08	2,28E+09	5,83E+08	66842,95	1669,881	1,72E+09	-2,6E+07
Dresses	Blue water consumption	1,73E+09	1,44E+09	17483,48	4278,905	2,93E+08	-4905063	3,8E+09	3,35E+09	27556,96	6744,287	4,62E+08	-7731219	4,61E+09	3,88E+09	44538,8	10900,42	7,47E+08	-1,2E+07
	Blue water use [kg]	1,27E+11	5,42E+10	7803608	115511,9	7,54E+10	-3E+09	1,98E+11	8,42E+10	12299822	182066,5	1,19E+11	-4,7E+09	3,22E+11	1,37E+11	19879527	294264,2	1,92E+11	-7,6E+09
	Total freshwater consum	6,82E+09	6,53E+09	34363,24	84139,67	3,29E+08	-4E+07	1,64E+10	1,59E+10	54162,35	132618,5	5,19E+08	-6,3E+07	1,84E+10	1,76E+10	87539,63	214344	8,38E+08	-1E+08
	Total freshwater use [kg]	1,32E+11	5,93E+10	7820488	195372,7	7,54E+10	-3E+09	2,11E+11	9,68E+10	12326428	307940,8	1,19E+11	-4,7E+09	3,36E+11	1,51E+11	19922527	497707,8	1,92E+11	-7,7E+09
Skirts	Blue water consumption	2,74E+09	2,07E+09	25210,45	6170,002	6,77E+08	-7072895	1,12E+10	9,83E+09	50753,33	12421,36	1,36E+09	-1,4E+07	1,09E+10	9,61E+09	49539,92	12124,39	1,33E+09	-1,4E+07
	Blue water use [kg]	2,5E+11	8,04E+10	11252476	166563,3	1,74E+11	-4,3E+09	4,96E+11	1,55E+11	22653329	335323	3,5E+11	-8,6E+09	4,84E+11	1,51E+11	22111737	327306,2	3,42E+11	-8,4E+09
	Total freshwater consum	1,06E+10	9,85E+09	49550,36	121325,9	7,59E+08	-5,8E+07	5,08E+10	4,94E+10	99754,09	244251,6	1,53E+09	-1,2E+08	4,96E+10	4,83E+10	97369,18	238412,1	1,49E+09	-1,1E+08
	Total freshwater use [kg]	2,58E+11	8,82E+10	11276816	281719,2	1,74E+11	-4,3E+09	5,36E+11	1,95E+11	22702330	567153,2	3,5E+11	-8,7E+09	5,23E+11	1,9E+11	22159566	553593,8	3,42E+11	-8,5E+09
Trancksuits	Blue water consumption	4,6E+09	4,03E+09	43718,42	10699,64	5,87E+08	-1,2E+07	5,15E+09	4,42E+09	55512,81	13586,2	7,45E+08	-1,6E+07	2,9E+09	2,49E+09	30962,45	7577,746	4,16E+08	-8686644
	Blue water use [kg]	2,81E+11	1,37E+11	19513355	288843,9	1,51E+11	-7,4E+09	3,57E+11	1,75E+11	24777684	366768,5	1,91E+11	-9,4E+09	1,99E+11	9,74E+10	13819835	204566,3	1,07E+11	-5,3E+09
	Total freshwater consum	1,96E+10	1,91E+10	85927,19	210395,9	6,58E+08	-1E+08	2,13E+10	2,06E+10	109108,7	267156,7	8,36E+08	-1,3E+08	1,19E+10	1,15E+10	60855,74	149007,5	4,66E+08	-7,1E+07
	Total freshwater use [kg]	2,96E+11	1,52E+11	19555563	488540,2	1,51E+11	-7,5E+09	3,73E+11	1,91E+11	24831279	620339	1,92E+11	-9,6E+09	2,08E+11	1,06E+11	13849729	345996,1	1,07E+11	-5,3E+09
Gloves	Blue water consumption	1,93E+09	1,84E+09	20022,92	4900,407	89609957	-5617513	1,67E+09	1,57E+09	24159,16	5912,71	1,08E+08	-6777952	3,29E+09	3,12E+09	41408,55	10134,32	1,85E+08	-1,2E+07
	Blue water use [kg]	8,34E+10	6,38E+10	8937066	132289,8	2,3E+10	-3,4E+09	1,01E+11	7,76E+10	10783243	159617,6	2,78E+10	-4,1E+09	1,73E+11	1,33E+11	18482364	273582,8	4,76E+10	-7E+09
	Total freshwater consum	8,95E+09	8,9E+09	39354,43	96360,78	1,01E+08	-4,6E+07	7,41E+09	7,34E+09	47484,08	116266,5	1,21E+08	-5,6E+07	1,49E+10	1,48E+10	81387,21	199279,6	2,08E+08	-9,5E+07
	Total freshwater use [kg]	9,04E+10	7,08E+10	8956398	223750,2	2,3E+10	-3,4E+09	1,07E+11	8,34E+10	10806568	269971,4	2,78E+10	-4,2E+09	1,85E+11	1,44E+11	18522342	462728,1	4,76E+10	-7,1E+09
Handkerch	Blue water consumption	51822297	51905153	296,6472	72,6014	0	-83225,6	55643846	55730752	311,1442	76,14938	0	-87292,8	40050121	40125859	271,1603	66,36373	0	-76075,1
	Blue water use [kg]	8,63E+08	9,13E+08	132406	1959,924	0	-5E+07	9,03E+08	9,56E+08	138876,6	2055,704	0	-5,3E+07	7,98E+08	8,44E+08	121030,1	1791,533	0	-4,6E+07
	Total freshwater consum	2,59E+08	2,6E+08	583,0509	1427,622	0	-683243	2,79E+08	2,8E+08	611,5442	1497,389	0	-716633	1,99E+08	2E+08	532,9571	1304,965	0	-624541
	Total freshwater use [kg]	1,07E+09	1,12E+09	132692,4	3314,944	0	-5,1E+07	1,13E+09	1,18E+09	139177	3476,943	0	-5,4E+07	9,57E+08	1E+09	121291,9	3030,135	0	-4,7E+07
Scarves	Blue water consumption	3,72E+08	3,09E+08	4819,582	1179,544	64708223	-1352154	6,91E+08	5,32E+08	12051,2	2949,409	1,62E+08	-3381014	9,41E+08	7,53E+08	14338,63	3509,233	1,93E+08	-4022761
	Blue water use [kg]	3,13E+10	1,55E+10	2151181	31842,58	1,66E+10	-8,2E+08	7,86E+10	3,9E+10	5378953	79621,27	4,16E+10	-2E+09	9,34E+10	4,64E+10	6399928	94734,11	4,94E+10	-2,4E+09
	Total freshwater consum	1,48E+09	1,42E+09	9472,739	23194,35	72572406	-1,1E+07	2,51E+09	2,36E+09	23686,26	57996,68	1,81E+08	-2,8E+07	3,61E+09	3,43E+09	28182,12	69004,98	2,16E+08	-3,3E+07
	Total freshwater use [kg]	3,24E+10	1,66E+10	2155834	53857,39	1,66E+10	-8,3E+08	8,04E+10	4,09E+10	5390589	134668,5	4,16E+10	-2,1E+09	9,61E+10	4,9E+10	6413771	160229,9	4,95E+10	-2,5E+09
Ties	Blue water consumption	1,11E+08	1,12E+08	1899,669	464,9249	0	-532960	2,1E+08	2,11E+08	4019,016	983,6133	0	-1127551	1,78E+08	1,78E+08	2934,7	718,238	0	-823342
	Blue water use [kg]	5,81E+09	6,13E+09	847901,8	12550,96	0	-3,2E+08	1,23E+10	1,3E+10	1793854	26553,3	0	-6,8E+08	8,96E+09	9,46E+09	1309879	19389,32	0	-5E+08
	Total freshwater consum	5,11E+08	5,16E+08	3733,741	9142,204	0	-4375352	9,52E+08	9,61E+08	7899,25	19341,61	0	-9256666	8,22E+08	8,29E+08	5768,061	14123,31	0	-6759251
	Total freshwater use [kg]	6,21E+09	6,53E+09	849735,9	21228,24	0	-3,3E+08	1,31E+10	1,37E+10	1797735	44911,29	0	-6,9E+08	9,61E+09	1,01E+10	1312712	32794,39	0	-5E+08
Bed linens	Blue water consumption	5,92E+09	4,1E+09	20467,26	5009,154	1,83E+09	-5742174	9,46E+09	6,48E+09	33409,26	8176,579	2,99E+09	-9373107	4,32E+09	2,8E+09	17090,35	4182,69	1,53E+09	-4794768
	Blue water use [kg]	5,29E+11	6,22E+10	9135393	135225,5	4,7E+11	-3,5E+09	8,64E+11	1,02E+11	14911950	220732,2	7,68E+11	-5,7E+09	4,42E+11	5,24E+10	7628137	112914,5	3,93E+11	-2,9E+09
	Total freshwater consum	2,26E+10	2,06E+10	40227,76	98499,17	2,05E+09	-4,7E+07	3,58E+10	3,25E+10	65664,87	160782,9	3,35E+09	-7,7E+07	1,56E+10	1,39E+10	33590,55	82247,71	1,72E+09	-3,9E+07
	Total freshwater use [kg]	5,46E+11	7,87E+10	9155153	228715,5	4,71E+11	-3,5E+09	8,91E+11	1,28E+11	14944205	373338,5	7,68E+11	-5,7E+09	4,54E+11	6,35E+10	7644637	190979,5	3,93E+11	-2,9E+09
Towels	Blue water consumption	4,1E+10	2,56E+10	137848,7	33737,08	1,54E+10	-3,9E+07	7,15E+10	4,43E+10	244014,6	59720,11	2,73E+10	-6,8E+07	5,95E+10	3,38E+10	230719,6	56466,28	2,58E+10	-6,5E+07
	Blue water use [kg]	4,36E+12	4,22E+11	61527648	910755,2	3,96E+12	-2,3E+10	7,72E+12	7,49E+11	1,09E+08	1612184	7,01E+12	-4,1E+10	7,31E+12	7,16E+11	1,03E+08	1524345	6,63E+12	-3,9E+10
	Total freshwater consum	1,45E+11	1,28E+11	270937,4	663400,3	1,73E+10	-3,2E+08	2,52E+11	2,22E+11	479603,2	1174326	3,06E+10	-5,6E+08	1,96E+11	1,67E+11	453472,2	1110343	2,9E+10	-5,3E+08
	Total freshwater use [kg]	4,46E+12	5,24E+11	61660737	1540418	3,96E+12	-2,4E+10	7,9E+12	9,27E+11	1,09E+08	2726791	7,01E+12	-4,2E+10	7,44E+12	8,5E+11	1,03E+08	2578222	6,63E+12	-4E+10
Table linen	Blue water consumption	1,03E+10	9,13E+09	42351,6	10365,13	1,18E+09	-1,2E+07	1,76E+10	1,56E+10	72360,27	17709,44	2,02E+09	-2E+07	1,44E+10	1,27E+10	59770,63	14628,26	1,67E+09	-1,7E+07
	Blue water use [kg]	4,25E+11	1,28E+11	18903288	279813,5	3,04E+11	-7,2E+09	7,26E+11	2,19E+11	32297411	478078,3	5,2E+11	-1,2E+10	6E+11	1,81E+11	26678128	394899,6	4,29E+11	-1E+10
	Total freshwater consum	4,73E+10	4,61E+10	83240,76	203818,1	1,33E+09	-9,8E+07	8,07E+10	7,86E+10	142221,9	348235,5	2,27E+09	-1,7E+08	6,59E+10	6,41E+10	117477,3	287647,6	1,88E+09	-1,4E+08
	Total freshwater use [kg]	4,62E+11	1,65E+11	18944177	473266,5	3,04E+11	-7,3E+09	7,9E+11	2,82E+11	32367272	808604,4	5,2E+11	-1,2E+10	6,52E+11	2,32E+11	26735835	667918,9	4,3E+11	-1E+10
Curtains	Blue water consumption	3,58E+09	3,11E+09	21035,26	5148,166	4,71E+08	-5901528	1,42E+10	1,22E+10	91558,85	22408,1	2,05E+09	-2,6E+07	9,11E+09	7,35E+09	79888,66	19551,94	1,79E+09	-2,2E+07
	Blue water use [kg]	1,83E+11	6,53E+10	9388914	138978,2	1,21E+11	-3,6E+09	7,97E+11	2,87E+11	40866539	604921,7	5,26E+11	-1,6E+10	7E+11	2,54E+11	35657646	527817,8	4,59E+11	-1,4E+10

	Total freshwater consum	1,6E+10	1,55E+10	41344,14	101232,7	5,28E+08	-4,8E+07	6,26E+10	6,05E+10	179956,1	440629,1	2,3E+09	-2,1E+08	3,73E+10	3,55E+10	157018,7	384466,1	2E+09	-1,8E+08
	Total freshwater use [kg]	1,95E+11	7,77E+10	9409222	235062,7	1,21E+11	-3,6E+09	8,46E+11	3,35E+11	40954936	1023143	5,26E+11	-1,6E+10	7,28E+11	2,83E+11	35734776	892731,9	4,59E+11	-1,4E+10
Carpets	Blue water consumption	1,31E+10	1,18E+10	238788,5	58441,07	1,34E+09	-6,7E+07	1,72E+10	1,56E+10	301573,6	73807,08	1,69E+09	-8,5E+07	1,36E+10	1,18E+10	330846,6	80971,35	1,85E+09	-9,3E+07
	Blue water use [kg]	1,06E+12	7,54E+11	1,07E+08	1577656	3,43E+11	-4,1E+10	1,33E+12	9,46E+11	1,35E+08	1992472	4,33E+11	-5,1E+10	1,48E+12	1,07E+12	1,48E+08	2185876	4,75E+11	-5,6E+10
	Total freshwater consum	4,89E+10	4,8E+10	469331,4	1149175	1,5E+09	-5,5E+08	6,51E+10	6,39E+10	592733,6	1451330	1,89E+09	-6,9E+08	4,6E+10	4,47E+10	650268,7	1592207	2,08E+09	-7,6E+08
	Total freshwater use [kg]	1,09E+12	7,9E+11	1,07E+08	2668390	3,43E+11	-4,1E+10	1,38E+12	9,95E+11	1,35E+08	3369995	4,33E+11	-5,2E+10	1,52E+12	1,1E+12	1,48E+08	3697111	4,76E+11	-5,7E+10
TOTAL	Blue water consumption	1,27E+12	1,89E+11	1482396	362801,3	1,08E+12	-4,2E+08	1,43E+12	2,84E+11	1968586	481791,6	1,14E+12	-5,5E+08	1,46E+12	2,44E+11	1884095	461113,2	1,22E+12	-5,3E+08
	Blue water use [kg]	2,22E+13	4,59E+12	6,62E+08	9794065	1,79E+13	-2,5E+11	3,02E+13	6,08E+12	8,79E+08	13006287	2,45E+13	-3,3E+11	2,83E+13	5,87E+12	8,41E+08	12448059	2,28E+13	-3,2E+11
	Total freshwater consum	9,09E+11	8,35E+11	2913603	7134064	7,81E+10	-3,4E+09	1,44E+12	1,33E+12	3869195	9473868	1,07E+11	-4,5E+09	1,18E+12	1,09E+12	3703130	9067252	9,94E+10	-4,3E+09
	Total freshwater use [kg]	2,29E+13	5,26E+12	6,63E+08	16565328	1,79E+13	-2,6E+11	3,13E+13	7,14E+12	8,81E+08	21998363	2,45E+13	-3,4E+11	2,92E+13	6,73E+12	8,43E+08	21054198	2,28E+13	-3,2E+11