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MANAGING ENVIRONMENTAL SUSTAINABILITY IN THE TEXTILE SUPPLY CHAIN

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ABSTRACT

The project EcoLogTex will deliver a methodology and a tool to evaluate alternatives for textile supply chains taking into account the environmental impact through Life Cycle Assessment (LCA), plus costs and timing, thus satisfying corporate social responsibility constraints. The results of this project will allow textile companies to efficiently optimize their supply chains and suppliers to benchmark themselves.

An essential requirement for the tool is to study textile production pathways and determine data gaps. To this aim we prepared specific questionnaires for every productive step, tested them and collected data from suppliers along the supply chain, starting from the fiber production up to the assembly of a finished garment. In this paper we present first results of the suppliers' assessment.

INTRODUCTION

The project EcoLogTex will deliver a new methodology and a tool to evaluate alternatives for textile supply chains taking into account the environmental impact through Life Cycle Assessment (LCA), plus costs and timing, thus satisfying corporate social responsibility constraints. The results of this project will allow textile companies to efficiently optimize their supply chains and suppliers to benchmark themselves (Rizzoli et al. 2013).

LCAs of textile products typically show, on the one hand, that the use phase accounts for the highest relative contribution to the environmental impacts (e.g. (Cotton Inc. 2012), (Laursen et al. 2007), (Cartwright et al. 2011)). On the other hand, many studies (among other those previously cited) also indicate that there is much room for improvement in the production phase of textiles (see also (van der Werf and Turunen 2008), (Franov 2009), (Nielsen and Nielsen 2009)). On the whole, however, only few data on textile LCA is publicly available.

An essential requirement for the tool was therefore to study textile production pathways and determine the areas where data is needed, in order to plan and realize a high quality data collection. To this aim we prepared specific questionnaires for every productive step, tested

them and collected data from suppliers along the supply chain, starting from the fiber production up to the assembly of a finished garment. In this paper we present first results of the suppliers' assessment.

MATERIALS AND METHODS

The suppliers received questionnaires which they filled with data from their company. This data includes energy, chemical and water use, waste as well as emissions in water and air. After verifications of plausibility and interaction with the suppliers for correction and/or completion of data, the values were modeled into an inventory using the ecoinvent database v2.2 (www.ecoinvent.org) for background data.

Suppliers along the whole textile chain were asked to fill in data. The main steps in the chain (each step corresponding to a questionnaire) are the following – the order is not fixed as some processes can happen at different stages of the chain: cotton cultivation resp. sheep farming, scouring (wool), mercerizing, bleaching and dyeing, spinning, knitting, weaving, finishing, assembly.

The questionnaires are used as online forms in the EcoLogTex tool (Rizzoli et al. 2013). The tool defines modeling of emissions (mainly for the agricultural step, for example the nitrate leaching in cotton cultivation or the methane emissions from sheep farming), allocation rules and normalization to the functional unit.

For the evaluation of the companies, nine midpoint indicators following the recommendations of ILCD (EC-JRC 2011) have been chosen. These are global warming potential, water depletion, freshwater eutrophication, marine eutrophication, acidification, freshwater toxicity, human toxicity, land use and abiotic resource depletion.

RESULTS

The following picture shows draft results for two European spinning mills, spinning mill 1 and spinning mill 2. Spinning mill 1 processes mainly cotton fibres, spinning mill 2 mainly wool fibres. The main impacts' contributors are indicated in the diagram. The upstream processes for the fibre production are not included; only the transport of the fibre is taken into account.

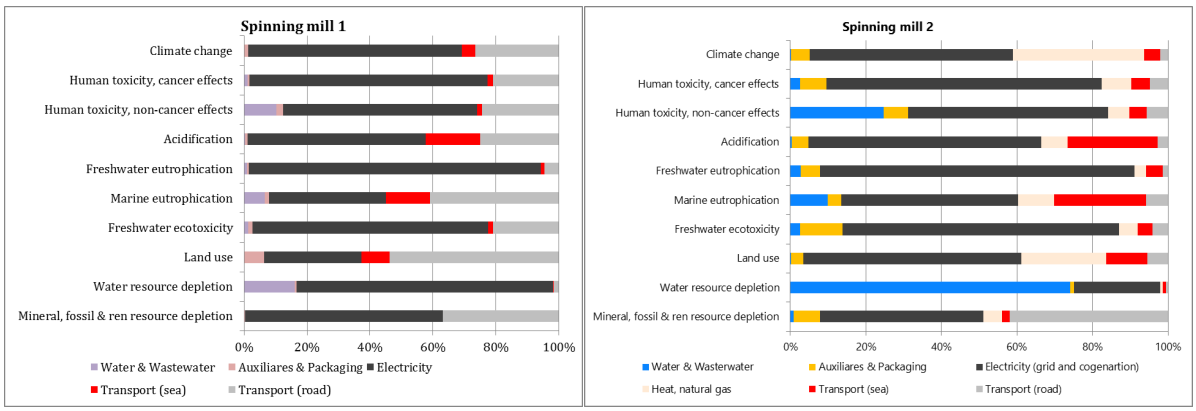

Figure 1: Results of selected indicators for two European spinning mills. The assessment includes the transport of the fiber but not its production.

Main contributors for the impacts in all categories for spinning mill 1 are electricity use and transports of spinning mill 1. Water use and wastewater disposal as well as packaging and auxiliaries account for no more than 17% of the impacts in all indicators. The results for spinning mill 2 show a similar pattern, with energy and transports being the most important contributors again. However, in this case, the water use is higher and influences the results more. This higher consumption can however not be attributed only to the different fibre but also to different production methods.

The following picture shows the Global Warming Potential (GWP) results for 4 spinning mills: C1 (processing mainly cotton, located in Asia), C2 (cotton, Europe), W1 and W2 (both: wool, Europe). The results show that for the same type of fibre processed, the results can vary greatly.

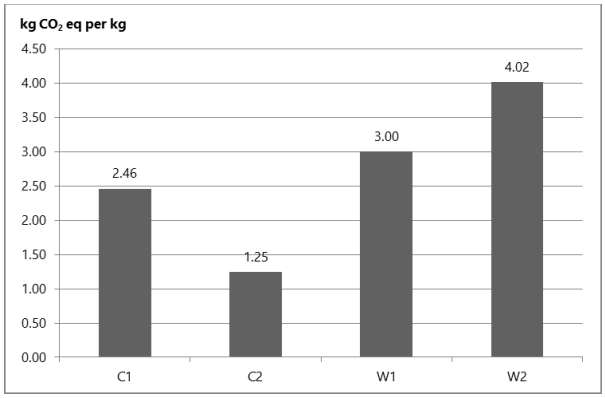

Figure 2: GWP results for four spinning mills using cotton (C1 and C2) and wool (W1 and W2). The assessment includes the transport of the fibres but not their production.

The inclusion of the fibre in the assessment in the case of C2 shows the great importance of the cotton cultivation process for all indicators, as we can see in figure 4.

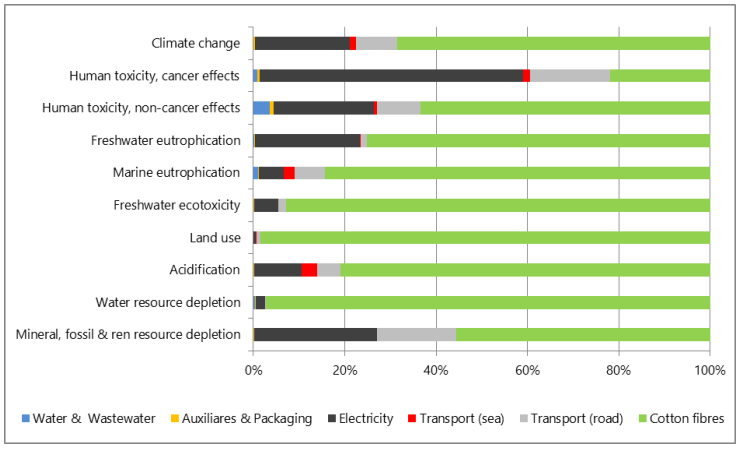

Figure 3 Results of selected indicators for a European spinning mill. The assessment includes the transport of the cotton and its production.

DISCUSSION AND CONCLUSIONS

One main difficulty of this type of assessment is to have the questionnaires understood and filled in correctly by the suppliers. At the present stage much effort has been invested to answer questions received from the suppliers, adapt the questionnaires to make them more comprehensible and easier to be answered. The testing phase of the questionnaires was also longer than planned as the contacts between Hugo Boss and suppliers operating at the beginning of the supply chain (which usually are not direct contacts) had first to be established. Furthermore, the lapse of time between sending out the questionnaires and receiving them back filled amounted to several months. After that, additional time was needed to clarify answers and obtain still missing ones. The evaluation of questionnaires shows that for the same process, here spinning, the results can vary greatly. In the case of the spinning mills, the electricity use and the transport of the fibre greatly influence the results.

This approach allows a thorough assessment of the environmental impacts of suppliers, who thereby also receive an interesting feedback on their activities. The environmental performance can be used as a criterion in the choice of the supplier as well as in the design of the product. However, enough support must be provided to the company answering the questionnaire to ensure the quality of the data.

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