



“Gheorghe Asachi” Technical University of Iasi, Romania



ENVIRONMENTAL FOOTPRINT IN THE PRODUCTION OF RECYCLED WOOL

Silvia Bamonti, Rosangela Spinelli, Alessandra Bonoli*

Department of Civil, Chemical, Environmental and Material Engineering, University of Bologna, Italy

Abstract

We computed the Product Environmental Footprint (PEF) to identify the environmental performance of recycled wool by means of data belonging to a real case study in Italy. First, we analyzed inventory data quality by computing the data quality rating (DQR) index, according to the criteria provided by the PEF protocol. Quality of specific and generic data (selected from the Ecoinvent database) was evaluated as excellent and good, respectively. We then quantified the impacts related to each relevant production process via Life Cycle Assessment (LCA). Specifically, we identified four main processes involved in the production of recycled wool for the selected case study: (i) clippings supply, (ii) clippings preparation, (iii) ragging, and (iv) dyeing. In the production of recycled wool, the rate of incoming materials subject to dyeing decreases to about 40%. Nevertheless, LCA revealed that this process is the most critical due to the high energy consumption and chemical substances employed. This result was confirmed by further analysis based on the Eco-indicator approach and the single point eco-indicator score. In particular, we found that environmental impacts associated with the production of recycled wool are mainly related to the following categories: (i) depletion of abiotic resources, (ii) inorganic particles released into the air, (iii) climate change, and (iv) human toxicity. We quantified that the contribution of the dyeing process to the relevant impact categories is higher than 75%. These results revealed how the use of recycled materials strongly increases the environmental performance associated with wool production, reducing the impact of the most environmental demanding processes.

Key words: life cycle assessment, material recovery, product environmental footprint, textile sector

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* Author to whom all correspondence should be addressed: e-mail: alessandra.bonoli@unibo.it; Phone: +39 0512090234; Fax: +39 0512090308