

EU COST Action 628: life cycle assessment (LCA) of textile products, eco-efficiency and definition of best available technology (BAT) of textile processing

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Abstract

The COST Action 628 was established to produce first hand, industrial environmental data of textiles in Europe, as well as to suggest tools for comparisons of present technologies and practices with cleaner applications, including the economic effects. The Action network also suggested criteria for ISO (Type III) Environmental Product Declaration (EPD) standards. It was concluded that new emerging cleaner technologies are in a key position when striving towards zero emissions in textile processing. It is also important to identify the most polluting stages of textile processing, with the help of life cycle assessment methodology, in order to focus the development of new technologies correctly. LCA was used to set up criteria for an Environmental Product Declaration for textile products. Unique, first hand industrial data were collected from five European textile industries.

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1. Background

The European Science Foundation's COST Action 628 is a network of 16 European universities and research institutes¹

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in textile, fibre materials and environmental sciences. Most COST Action 628 institutes have been involved in drafting the national background reports for the EC Documentation of Best Available Techniques in textile industries, as well as in developing the EU eco-labelling criteria for textile products.

The Action was based on the need for a wide first hand, practically oriented environmental database of the textile product chains. There is also a need for a simplified and balanced approach within the fibre production and the textile products sector. The textile industries require tools for comparisons of present technologies and practices with cleaner applications, including the economic effects.

This paper presents recent results of the scientific work by the COST Action 628 in LCA by presenting unique environmental data of textile products and industrial processing in 10 European countries. The Action has also started to look at the ISO Environmental Product Declaration process, in

order to suggest sustainability indicators for textile for textile products.

2. Objectives of the COST Action 628

Initial Action objectives were to propose methods and guidelines for a simplified and balanced LCA for textile products chain as well as to develop tools to evaluate and compare textile products, produced for similar end-use, with environmental criteria. Organisations for the European textile industry, as well as individual textile companies, have been involved when defining the objectives of the Action.

The Action was also designed to develop eco-efficiency indicators for the processes and phases of the whole textile chain, and to define system boundaries for cleaner textile processing.

The Action network, including scientists and industrial experts, will also suggest criteria for Environmental Product Declaration (EPD) standards for ISO and propose calculation and allocation rules for multi-product systems and for dematerialisation, recycling, energy generation and disposal, aiming for zero emissions.

3. Results

The Action brought together a multi-disciplinary and multicultural team under one umbrella and, thus, co-ordinated the approach to LCA within the fibre production and textile products sector. The Action improved international data collection and exchange of environmental information between industries and research organisations.

The Action research network has collected a wide European database of textile processing and has performed several life cycle inventory analyses, and looked at new, emerging cleaner technologies, in order to minimize the use of natural resources, to change production and consumption patterns and to move towards sustainable textile production and to zero emissions.

A scientific review of the EU BREF-draft, “Environmental pollution prevention and control – best available techniques in the textile industry” [1], with emphasis on emerging new technologies, has also been performed within the Action.

3.1. LCA on textile product chain²

Assigned tasks of WG 1 were to evaluate existing methods and develop consistent instruments for LCA and eco-labelling as well as criteria for environmental product declaration with ISO in textiles. Ten institutes from Belgium, Denmark, Finland, Greece, Great Britain, Lithuania, Poland, Romania, Sweden and Switzerland are actively contributing to the results gained so far by the action. The common umbrella for the research activities originated in the IPPC directive [1] for “best available

techniques” asking for environmental aspects. Starting points among others were the Finish matrix, a list of indicators, with focus on finishing (Nieminen-Kalliala, 1999) [2] (see Appendix A), Nieminen-Kalliala, 1997) [3]) as well as process LCA (Tobler, 2001; Boura, 2001) [2] for textiles. This matrix was enlarged during the action for all processes along the value added chain, based on consensus of the members, partly represented in Table 3.1.1. The working group developed its first activities in two different areas: new cleaner textile technology and environmental assessment methods. Textile technology dealt with technical aspects, product development and process optimisation including quality aspects of individual companies towards cleaner production or new legislations requirement (Dumitrescu, 2002; Struszczyk, 2002, 2003; Visileanu, 2004) [2]. Environmental assessment covered life cycle of products as inventory (LCI), assessment (LCA), environmental product declaration (EPD) and eco-labelling (Fig. 1). Life cycle assessment is considered to be the appropriate scientific base for an environmental product declaration (EPD) and labelling (according to ISO criteria), to be applied in communication towards the consumer. But LCA studies may not be carried out without definition of the quality aspect of textiles, the so-called textile specifications. Such definitions are generally absent if LCAs are performed by persons with no knowledge of the textile technology. Results become false if an inappropriate functional unit, often kg textiles, is used. The functional unit must be chosen in order to fit the company’s quality parameters, for example fineness (tex or denier) for a yarn and g/m^2 for a fabric. Only then can LCA be a support for product development and process optimisation within companies. Due to the complexity of LCA results, inventories (LCI or indicators) or simplified LCA may be applied in practice. However, data from full LCA should be the basis for the choice of significant impacts.

3.1.1. Labelling systems

Analyzing the available eco labelling systems (Boura, 2002; Nyqvist-Kuusola, 2002) [2] also within Task Force BAT of COST action (Tobler et al., 2003) [2] strengthened the conclusion that none of the existing labelling systems

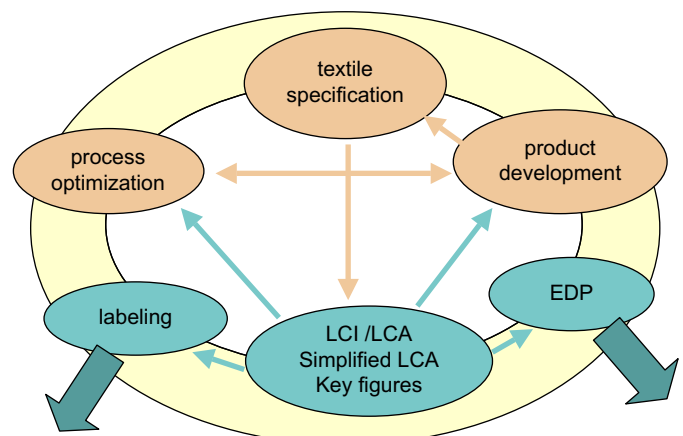


Fig. 1. Environmental aspects in textile production.

² Marion Tobler, ETH Zurich.

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