Smart Textiles
Case study
Conductive yarn manufacturer (Germany)*

Figure 1: Silver coated conductive yarn made from Shiedex

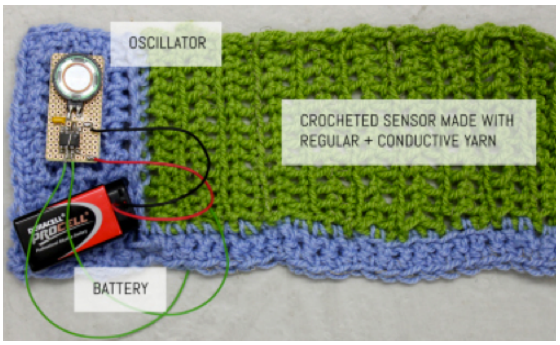

Figure 2: Croached sensor

The company produces and markets electro-conductive polyamide fibres, yarns, and fabrics as well as plastic components. The electro-conductivity is achieved by a silver coating on polyamide surfaces that are produced with a proprietary chemical process. The SME, located Germany is run by a private family and employs ca. 30 employees. The main product (fig. 1) is a material that combines polyamide and silver for anti-static and electro-conductive properties. The latter is mainly used by smart textiles manufacturers as a intermediate material. Conductive yarns and fibres can be used to shield electromagnetic fields but also to produce electrical interconnections in smart textiles. Other application areas include textile sensors (e.g. fig. 2), textile integrated data connections and thermal conductivity (heat dissipation). Silver plated polyamide textiles are also applied for anti-bacterial garments, e.g. for medical purposes. The main market places are in Germany and western Europe but also internationally (overseas).

The company was recruited for LCA to go by TU Delft and an introduction and mentoring in was offered. A representative of the company was interested to receive a face-to-face training for the LCA to go tool. The international sales and marketing manager specializes in contacts with customers and stakeholders in the smart textiles sector. It was agreed that the training is provided at the occasion of a site visit at TU Delft on 7 November 2013. A general introduction to LCA and eco-design was provided prior to the LCA to go training. Next to the company representative, the training session was also attended by a group of four students from the industrial design faculty (Delft) who engaged in a sustainable design course (Explore Lab) and had the assignment to develop a sustainable design concept for a smart textile product. The company provided them with a developer kit, which was the basis for the environmental assessment using the LCA to go tool.

Then, the company was registered in LCA to go and the beta version of the smart textiles tool explained step-by-step. A case study project on the conductive material was created and assessed, based on data provided by the company and preliminary design specifications from the student project. This approach was useful because conductive yarns are intermediate materials and little information on the product life cycle (use and disposal) is available. The test of the tool resulted in the following insights:

- There were too few inventory data available about the chemical processes that are used to produce silver plated textile materials.

* company name anonymized

- At the early design stage, was hard to anticipate the differences between prototype stage and final product (e.g. quantity of conductive yarn in the product)
- There was uncertainty about the biodegradability of silver coated polyamide and the disposal routes of an electronic textile (cooling blanket (see fig. 3)).
- The result showed that the power consumption of the cooling bed-sheet is the dominating environmental impact (fig. 4). Further discussion of the results resulted in the conclusion that the use of such a product can help users to save substantial amounts of electricity due to the replacement of conventional room air condition (relevant for hot countries) (fig. 5).
- These secondary environmental effects cannot directly be modeled with the simplified LCA to go approach but only by means of a fully developed LCA.

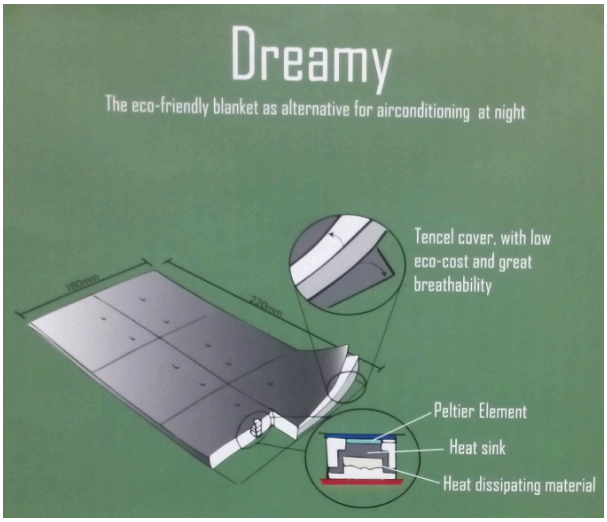

Figure 3: The design concept of a cooling blanket that served as a basis for the LCA

	Eco-costs	*Energy consumption (kWh)*
AC	*252*	*2628*
Waterbed	*86*	*900*
Simple blanket	*4*	*0*
Dreamy	*25..8*	*190*

Figure 4: Eco-cost comparison of different product systems for bed-room acclimatisation

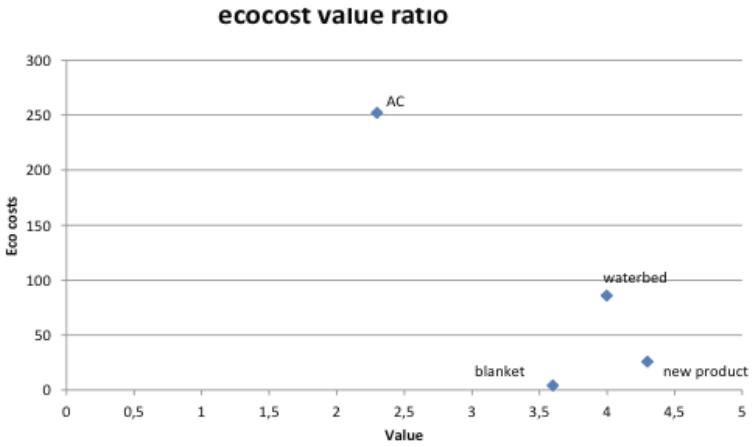

Figure 5: Eco-cost value comparison of different product systems for bed-room acclimatisation

* company name anonymized