STEP 4 CASE STUDY

Product Environmental Footprint (PEF)

A Tunisian company operating in the agro-food sector successfully completed the first TEST cycle. After that, it decided to keep on implementing RECP options in its processes. At the same time, it wished to extend the scope to the whole life-cycle of its production of pasta.

This decision was due to the company's increased awareness that a more environmentally friendly product would be more competitive, becoming also more attractive for the European markets where the company is exporting.

After attending an EU seminar on the Product Environmental Footprint (PEF) initiative which was organized by UNIDO under the SiwtchMed initiative, the company decided to perform an LCA analysis of its products using the PEF method, seeing this as an opportunity to measure and if possible improve environmental performance of its pasta product throughout its life cycle and to communicate about it with its stakeholders.

»The PEF study has also helped the company respond to the needs of the European single green market and it will prevent company falling behind the competition.«

The company received external assistance in applying the PEF category rules and guidelines developed by the EC for Life Cycle Assessment (LCA) based product claim standards. LCA is a well-known and widely used method for assessing the potential environmental impacts and resources used throughout the entire life cycle of a product or process, including raw material acquisition, production, use, and end-of-life phases as defined by SETAC and codified within ISO 14040-44 standards.

For the PEF project, the company selected "Spaghetti II", its best-selling product made from durum wheat semolina and packed in 1 kg packs. The main objective of this assessment was to evaluate the overall environmental burden of the company's Spaghetti II production system and to identify the environmental hot spots within the product's entire life-cycle (i.e., the places in the life-cycle that make a significant contribution to the overall environmental burden).

The study was undertaken by local expert from a Tunisian organization with the technical support of a UNIDO international expert. The PEF analysis applied the LCA methodology and the PEF category rules including the circular economy formula for waste management. The functional unit to be analyzed was defined as the production of 1 kg of Spaghetti II. The data collection phase built on much information already available from TEST implementation.

The LCA assessment boundary was established for the Spaghetti II production system and was divided in six sub-systems covering particular stages of the product life cycle including wheat production and import, pasta production process and packaging, distribution, cooking and end of life. Four of these were considered to be significant and were the subject of further analysis. A generic model for the life cycle of pasta is presented in figure 1.

1. Ingredients production

Cereals cultivation → T → Transformation (semolina) → T

Water, electricity, natural gas, pesticides, fertilizer, transport, emission to air and to water, waste water

Water, electricity, natural gas, transport, waste

3. Packaging production

Raw materials production → T → Packaging production

Water, electricity, natural gas, transport, waste water

2. Pasta production

Water, electricity, natural gas, transport, waste water

T → Dough preparation, drawing, drying, packaging

4. Distribution

Transport to distribution centre → Transport to retail → Transport to consumer's home

5. Cooking

Cooking at consumer's home

Water, salt, electricity, natural gas, waste water

6. End of life

Waste treatment facility: Lanfilling/incineration/recycling

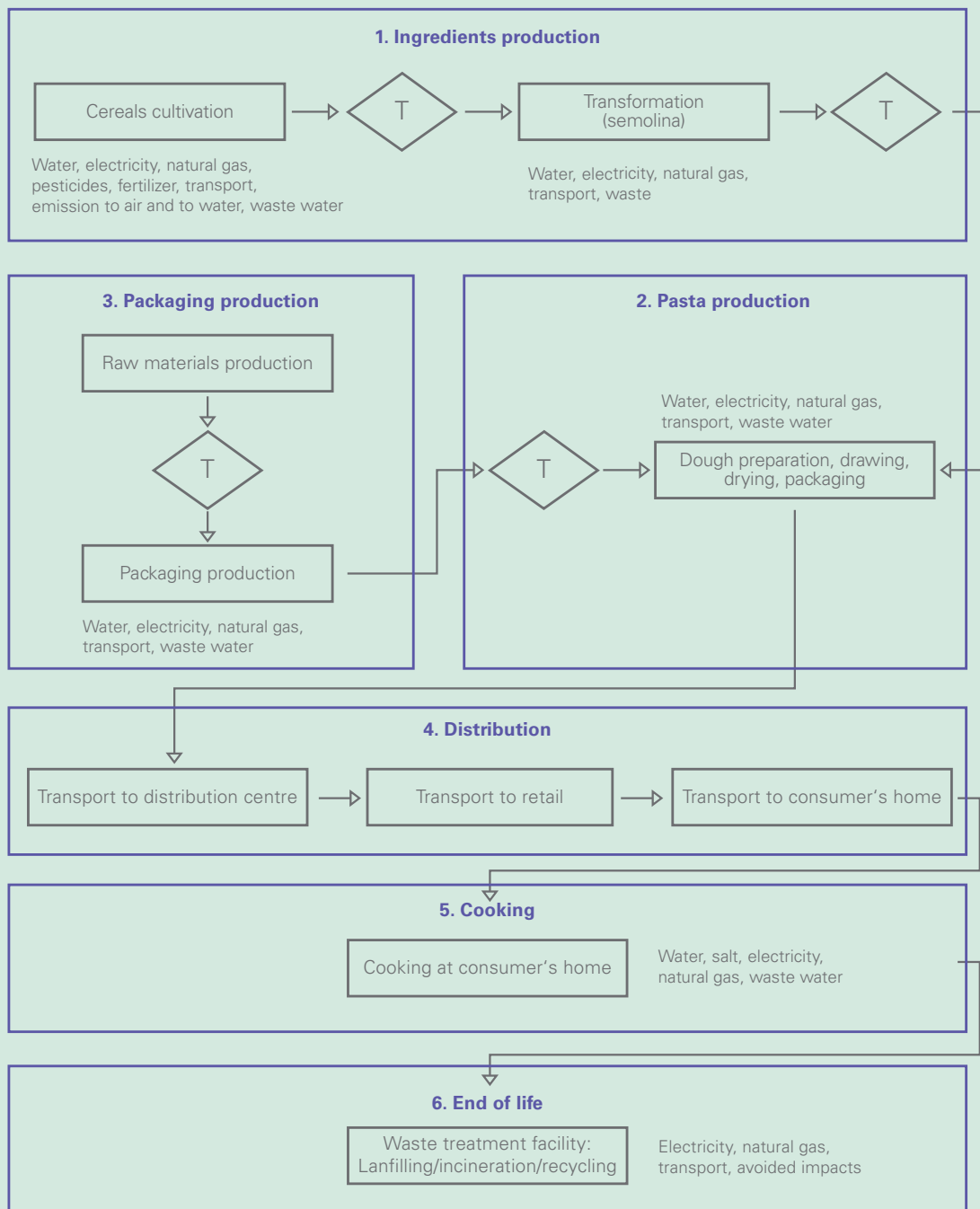Electricity, natural gas, transport, avoided impacts

FIGURE 1: Generic life cycle model for pasta

The study identified the wheat and pasta production process subsystems as being the major contributors to the overall environmental burden of the entire Spaghetti II system (they were responsible for the highest impact in fourteen out of the 16 predefined impact categories). The relative contribution of each subsystem to the environmental impacts of Spaghetti II is shown in figure 2.
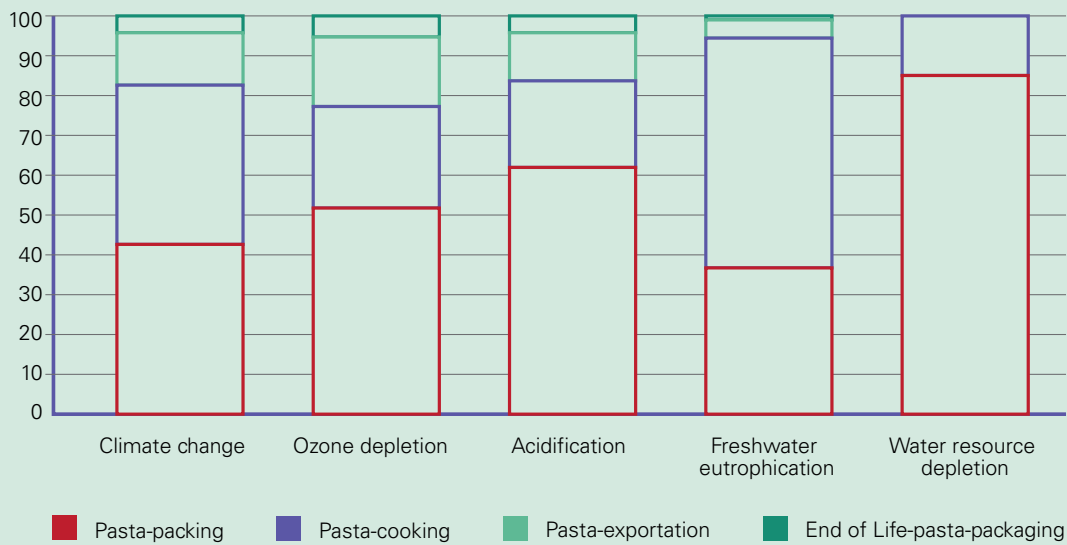
FIGURE 2: Relative contribution of four basic subsystems of the life cycle of Spaghetti II to the predefined environmental impact categories

The analysis was further refined by breaking down the wheat production sub-system to define the most relevant elements for the environmental categories. The result clearly identifies the pasta production including wheat grain production and its import as being the greatest contributors to the environmental impact of the pasta production process.

More specifically, the total GHG emissions of the Spaghetti II system are estimated to be approximately 1.2 kg CO_2 per kg of Spaghetti II. Approximately 30% of these emissions are attributable to the production and import of wheat, especially due to the emission of NOx associated with the use of fertilizers during wheat production as well as to the emissions of CO2 by sea transport freight during the wheat's import.

The water resource depletion (WRD) of the system is estimated to be approximately 12.4 liters per kg of Spaghetti II produced. The subsystem that contributes the most in the WRD impact category is wheat production (~86%).

After completing the pilot PEF project, company management held a strategic discussion on the PEF results drawing the following lessons:

- Efforts at environmental improvements of the whole pasta process should focus on shifting to the use of locally produced eco-friendly wheat;
- The PEF exercise provided a sound methodology for measuring environmental performance, and it is a useful communication tool to provide reliable and transparent information on the company's environmental performance to its stakeholders;
- The PEF results brought about an understanding of the product's environmental hotspots and about the potential to reduce its environmental impacts;
- Outputs of the PEF study supported decision making based on LCA thinking, thus enabling the exploration of eco-design strategies. In this respect, the company is also planning to switch to the use of biodegradable packaging.

The company believes that the PEF could be considered as part of a circular economy. The PEF study has also helped the company respond to the needs of the European single green market and it will prevent company falling behind the competition.