

of independent analysis of: packaging machine, beverage packaging and finally, including realisation of packaging process elements - filling and closing, to the whole process. Several configurations of this process components have been also considered. Three types of packaging machines have been considered separately and five packagings have been assessed: glass bottles (returnable and non-returnable), PET bottle, can and cardboard box. On the base of results, elementary components of packaging process have been put in order of their environmental interactions, expressed by quantity data, completed by detailed characteristics. Regardless of the type of packaging process configuration, the main source of negative influence on the environment has come from packaging. Technology process's components and packaging machines respectively have caused much less environmental burdens.

(50-24) **EPD and LCA in environmental characterisation of food processing machines.** Jurek, A.<sup>1</sup> and Kurczewski, P.<sup>2\*</sup> <sup>1</sup>Wroclaw University of Technology, ul. Lukasiewicza 7/9. <sup>2</sup>Poznan University of Technology, ul. Piotrowo 3. The industry has been a dominant human activity in environmental degradation, also a prevailing source of the environment pollution. A machine as a subject and object of the industry activities should be analysed from the environment point of view because of their specific role in the industry processes. Complex information about the machine influence in the life cycle on the environment is needed. Life Cycle Assessment (LCA) and Environmental Product Declaration (EPD) connected with ISO 14000 standard series which concern product in general are useful tools which respond to the mentioned above needs. The LCA meets its practical continuation in the EPD and as such provides quantified environmental life cycle product data. This information expressed in the form of an ecolabel could be helpful for producers dealing with marketing activities, creating enterprise image and for consumers in making environmentally conscious and responsible decisions. Requirement to create a specific simple way to characterise environmental interaction generated by machines and appliances is popular with the design engineers. Results of the project realised at the Wroclaw University of Technology have provided information can meet such a requirement. The main aim of the project is to join selected elements of EPD and LCA and to develop the idea of independent analysis of energy and material aspects of generated environmental burdens. On the base of case study dedicated to the complete environmental valuation of the group of food processing machines the characteristic oriented on specific feature of machine's environmental interaction is proposed.

(50-25) **Life Cycle Inventory Analysis of spent alkaline batteries treatment.** Xará, S.M.<sup>1,2</sup>, Almeida, M.F.<sup>1</sup>, Silva, M.<sup>2</sup> and Costa, C.A.V.<sup>1</sup> <sup>1</sup>Faculdade de Engenharia da Universidade do Porto. <sup>2</sup>Escola Superior de Biotecnologia. Life cycle assessment (LCA) is a technique for assessing the environmental impact of a system from cradle to grave, i. e. from the extraction of raw materials to the final disposal. The need of including waste treatment step in a product life cycle analysis and the wide use of this tool to evaluate different options on solid waste management practices, has increased the attention of LCA practitioners for this final step of the products life. In the case of alkaline batteries - a complex product which contains metal, plastic and mineral fractions, including heavy metals - besides the effort to reduce the voluntary addition of these substances by the producers, this analysis is impeded by the lack of scientific data concerning its behaviour when incinerated or disposed of in a landfill. Under this subject, a project to compare the environmental impact of incineration, landfilling and recycling of alkaline batteries using LCA is undergoing at the Engineering Faculty of Porto University. The objective of this paper is to present the preliminary inventory of the batteries incineration and landfilling in terms of materials, energy consumption, gaseous emissions, effluents and solid waste. This inventory includes the results of some laboratorial incineration and landfilling experiments already. Other data that depends on the incineration process itself is obtained at the incineration plant explored by the multimunicipal company operating nearby the Porto city.

(50-26) **Lca in the production of canned tuna.** Milazzo, A.<sup>1\*</sup>, Sparacia, S.<sup>2\*</sup> and Bonura, V.<sup>3</sup> <sup>1</sup>Department of Commodity Science - University of Palermo - Viale delle Scienze. <sup>2</sup>PhD student Technology and Economics of Products and Processes to Safeguard the Environment-Department of Commodity Science-. <sup>3</sup>Quality manager - via Tiro a segno, 70. The analysis of scenarios drawn up using LCD, aimed at setting out the limits and the ability to exploit wastes arising from the tuna processing industry, is a key element for a conscious development of the manufacturing structure that targets an optimal allocation of by-products arising from production of this food as well as economic criteria. This is an important issue in countries such as Italy and Spain, the major producers and consumers of canned tuna within the EU. This work carries out an analysis of wastes from processing and the various alternative uses linked to the scenarios set out in Life Cycle Design, also through the use of points for savings revealed by the application of Life Cycle Costing. Those businesses that apply these innovative methods gain a competitive advantage; given that wastes arising from processing in canned tuna production vary between 60 and 65%, depending on the species and size of the tunafish. The impact of such wastes on the environment is extremely high and production is very wasteful in economic terms if these wastes are not adequately exploited. Exploitation can be achieved by applying LCD and LCC, based on alternative usage of them: in the animal feed sector, in the extraction and use of enzymes for the employment of hydrolysed proteins in the cosmetic industry and, lastly, in the extraction of polyunsaturated fatty acids (omega 3 and 6). The latter are present in high levels in several parts of the tuna that is discarded.

(50-27) **Life Cycle Design in the production cycle of extra-virgin oil: quality strategies and techniques.** Milazzo, A.<sup>1</sup>, Sparacia, S.<sup>2\*</sup> and Antonella, L.<sup>3\*</sup> <sup>1</sup>Department of Commodity Science-University of Palermo-Viale delle Scienze. <sup>2</sup>PhD student Technology and Economics of Products and Processes to Safeguard the Environment-Department of Commodity Science-. <sup>3</sup>Agronomist of University of Palermo - Specialized in olive oil quality via G. Gentile, 38. The building of a life cycle design for the comparative assessment of quality strategies and techniques aimed at the differentiation of the various business processes for oil extraction requires the construction of an adequate quality system to identify the standards of conformance of the variables inherent to operations. Opportune monitoring of those points defined as critical is necessary in order to maintain the high standard of quality of Italian oil compared to oil produced elsewhere. This high standard derives from the suitability of the terrain, meaning the optimal pedoclimatic conditions and the extremely numerous cultivars present (up to 350 over the country). The aim of this paper is to examine the variables that are relevant and important for building an LCD in line with the objective proposed.

(50-28) **Comparative LCA of drinking water delivery systems: tap water, PuR waterfilter and bottled water.** Van Hoof, G.<sup>1\*</sup> and Schowanek, D.<sup>1\*</sup> <sup>1</sup>Procter & Gamble Eurocor, Temselaan 100. A comparative LCA was performed on normal tap water, filtered tap water and natural mineral water delivered in bottles. Filtered tap water is obtained by use of a PuR FM3000 faucet mounted filter. The filter improves taste and odour of the drinking water, provides convenience vs. mineral water (i.e. no heavy bottles to carry from retailers), removes eventual traces of pollutants (e.g. lead, pesticides) and some parasitic cysts. The function of all systems is the delivery of safe and healthy water, ignoring aspects of nutrition and secondary (subjective) aspects such as taste, etc. that are difficult to capture in an LCA study. Significantly lower (up to 4 orders of magnitude) energy, solid waste, emissions to air and water and lower impact scores are observed with tap water vs. bottled water. PuR filtered water requires more energy and has higher emissions than tap water, but compares favourably vs. bottled water with consistently lower (2 orders of magnitude) values for energy, solid waste, air- and waterborne emissions and impact scores. A sensitivity analysis indicates that these conclusions are unlikely to change under the realistically chosen set of assumptions.