ENVIRONMENTAL IMPACT OF TOMATO PURÉE: ANAEROBIC DIGESTION OF BY-PRODUCTS AS MITIGATION STRATEGY

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INTRODUCTION
Agricultural by-products and wastes usually represent a cost for farmers and agro-food industries. Nevertheless, concerning their use to produce biogas by the anaerobic digestion (AD) there are unexplored possibilities. In this study, the environmental benefits arising from the AD of tomato by-products was evaluated, using LCA, as strategy to reduce the environmental load of tomato purée. Nine impact categories were evaluated using the Recipe midpoint LCIA method.

METHODS
Two scenarios were compared: in BS the tomato by-products are used as organic fertilisers; in AS these matrixes are digested. A gate to gate perspective was applied: the core system is the tomato processing and the by-products management; the cultivation, the packaging and delivery and distribution of the tomato purée were excluded because equal into BS and AS. The functional unit is 1 kg of tomato purée. Inventory data were collected in an agro-food industry processing each year 200,000 tons of fresh tomato. Lab tests were carried out to measure the CH₄ production of tomato by-products. Technical and operative data about AD were achieved by means of surveys in real AD plants fed with by-products from food industry.

RESULTS
For 8 of the 9 evaluated impact categories, the main hotspots of processing step are the consumption of electricity and the fuel combustion emission. These latter are an environmental hotspots for CC (62%); POF (55%) and ME (about 57%). For all the evaluated impact categories, the AD of byproducts improves the environmental performances of tomato purée (-14% for CC, -43% for OD; -20% for TA; -16% for FE; -12% for ME; -14% for POF, -18% for PM; - 19% for MD and – 11% for FD).

CONCLUSIONS: In this study two different by-products management systems in the tomato industry were compared using LCA method. The results highlighted that the AD of tomato wasted, skins and peels is an effective mitigation solution because it reduced the impact load for all the environmental effects considered.