

Starch Europe LCA Results - Summary of Methodology

Introduction

This summary focuses on the methodology used to perform this starch sector Lifecycle Analysis (LCA) study, and what you can expect to find in the report. Notably, this summary will explain what products are included, which environmental impacts were studied and how the calculations were made. It will also address the question of PEF compliance. Complete results of the study can be found in the report itself, and will not be listed here.

Products included and functional unit

The scope of this LCA are products of the starch industry. A selection of these products are covered by this external report.

These products are:

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| 1. Dry Wheat Feed | 8. Maltodextrin |
| 2. Dry (solubilised or not) Gluten | 9. Liquid Sorbitol |
| 3. Dry Corn Feed | 10. Dry Sorbitol |
| 4. Potato Proteins | 11. Native Starches |
| 5. Wet Pulp (Potatoes) | 12. Modified Starch |
| 6. Liquid Glucose (including fructose and glucose syrups) | 13. Dextrins |
| 7. Dry Dextrose | 14. Potable Alcohol |

The functional unit (FU) is defined as *“1 tonne DS (dry substance) of starch industry product delivered at the customers’ entry gate”*.

Environmental Impacts Studied

The methodology used to determine the environmental impacts of the starch products conforms to the PEF and LCA methodology as prescribed in ISO standards 14040 and 14044 (ISO, 2006). The impact categories included are:

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|---|-------------------------------|
| ● Climate change | ● Acidification |
| ○ Climate change -biogenic | ● Eutrophication, terrestrial |
| ○ Climate change - land use and land use change | ● Eutrophication, freshwater |
| ● Ozone depletion | ● Eutrophication, marine |

- Human toxicity, cancer
- Human toxicity, non-cancer
- Particulate matter
- Ionising radiation, human health
- Photochemical ozone formation, human health
- Ecotoxicity, freshwater
- Land use
- Water use
- Resource use, minerals and metals
- Resource use, fossils

Agriculture Database Used

The background data on **agriculture**, i.e. growing of wheat, maize and potato crops, that was used in this study was obtained from the Agri-footprint database (Agri-footprint 5 – economic allocation). Company-specific data on purchased amounts of wheat, maize and potatoes and their countries of origin were provided by Starch Europe members. This data was combined into an averaged and weighted dataset.

Allocation Methods Used

Multi-functional processes are handled according to the prescriptions of the PCR. For the agricultural processes economic allocation has been applied, for the starch industry processes physical allocation based on dry substance mass has been applied. Mass allocation was chosen because:

- Mass allocation offers the clearest picture throughout the process tree, it relates directly to the functional unit, and is based on the best available data.
- The impact of the starch slurry process is caused mainly by energy use. As the impact of energy use for cleaning, milling, grinding, rasping,... is directly related to the mass of the process inputs, it is logical to distribute these impacts to the outputs by mass allocation.
- In theory, allocation should be done based on a physical property that is relevant to the function of the provided co-products. The physical characteristics that are relevant for the function of the different co-products differ per starch industry product and as such it is not possible to set one single characteristic which is relevant for all the different output products other than mass.

PEF Compliance

In view of their mission to assure a reliable and sustainable supply of safe starch-based ingredients, Starch Europe (the European starch industry association) has published various studies on the environmental impact of the starch industry's products over the past decade. In 2012, a study with environmental profiles of a wide range of products was published, based on data collected from a significant number of starch plants across the EU in 2010. In 2015, Starch Europe published its Product Category Rules (PCRs) for the products of the starch industry. The PCRs were based upon the developments in LCA methodology that were ongoing at that time, such as the guidelines recommended by the Commission's Product Environmental Footprint pilots.

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Recently, an update of the PCRs was performed as well as an update of the associated life cycle assessment of the starch industry's products. Both the PCRs and LCA are updated following as closely as possible the *Zampori and Pant, 2019* PEF methodology report.