Life cycle assessment for Belém Café

The work includes a life cycle assessment for the Coffee Roasting Company Belém Café in Schüpfen. The aim of the work is to determine a benchmark for their coffee variety „Brasil", how much CO2 is caused for one kilogram of coffee. For this purpose, the supply chain, from cultivation in Brazil until the coffee beans are roasted and ready for sale at Belém Café, is examined.

Introduction

This work includes a life cycle assessment for the client, the coffee roaster Belém Café, in Schüpfen. For this purpose, the Life Cycle Assessment (LCA) of the life cycle of a coffee bean is assessed. An LCA comprises the following four sub-steps:
– Goal and scope definition
– Life Cycle Inventory
– Life Cycle Impact Assessment
– Interpretation

Results

The results of the work are structured according to the four sub-steps of the work. For the analysis of the values of the LCA, the program SimaPro was used.

Goal and Scope definition

Working closely with the client, it was possible to define the necessary goals and scope to the LCA. The objectives of the work include:
– Analysis serves to determine internal position
– Provide a CO2 value for the coffee variety „Brasil of Belém Café
– The LCA analysis serves as a decision support for further investigations and decisions

The scope of the work is limited to the coffee variety „Brasil" of Belém Café, since it represents the largest amount of processed coffee beans at Belém Café, 70%. This variety is an Arabica coffee bean from Alfenas in Brazil. The functional unit defined for the LCA was „one kilogram of the Brasil coffee type".

Life Cycle Inventory

Data collection is based on three phases of the coffee bean supply chain:
– Agricultural phase
– Transport phase
– Processing phase

For the first phase, assumptions from literature research were used for the most part since the cultivation takes place in Brazil. For this purpose, the Ecoinvent database is used and compared with input and output values from the literature research and adjusted if necessary.
For the second phase, the number of kilometers and the means of transport could be determined through the responsible company.
For the third phase, real data could be used. For this purpose, the consumption of the propane cylinders was counted in 2020 and the electricity bill could be used for the energy used. The propane is used in the roasting process to generate the heat.

Life Cycle Impact Assessment

IPCC 2013 is selected for the impact category. This impact category lists the climate change factors of the International Panel on Climate Change (IPCC) with a time horizon of 100 years.
The total greenhouse gas emissions generated by the supply chain amount to 4.34 kg CO2e for one kilogram of coffee beans of Belém Café's Brasil coffee type.

Interpretation

The LCA provides a good value for Belém Café on the CO2 consumption of their Supply chain. However, the benchmark of 4.34 kg CO2e has a certain tolerance, as many data and their inputs as well as outputs are based on assumptions. As an example, there are big differences in the consumption of energy, water etc. due to different cultivation methods. This shows that with a sustainable cultivation, some CO2 can be saved. This includes a careful handling of fertilizer and water consumption. It is also evident that most CO2 is produced during the cultivation and subsequent processing of the coffee cherries.

Tobias Vogt