The environmental impact of an energy drink

ESU-services
fair consulting in sustainability

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Goal

The aim of this poster is to analyse the environmental impact of an energy drink can (250ml), to examine the process stages with the highest environmental impact and the caused greenhouse gas (GHG) emissions. This study has been conducted as part of a practical training at ESU-services.

Method and Data

The inventory data for this study are taken from the ESU-services database [1]. The data includes the entire life cycle from agricultural production to supermarket taking food losses into account. The environmental impact is determined by means of the Ecological Scarcity Method 2013 [2] and the GHG emissions are defined by the IPPC 2013 with RFI Method [3]. According to this, the environmental impact is summarised to ecological scarcity points (UBP-2013) and the GHG emissions are represented in CO_2-equivalents.

The study is based on the following assumptions: the energy drink production takes place in Switzerland. The main ingredients for the drink are water, sugar, carbon dioxide, citric acid, and synthetic substances (e.g., taurine, caffeine, vitamins). All ingredients are Swiss products, apart from the carbon dioxide and the citric acid. Production of synthetic ingredients is approximated with a speciality chemical product. The transport of the products is included for different market scenarios.

Results

The results are shown in Fig. 1 and Fig. 2. The whole environmental impact and the GHG emissions of the energy drink are subdivided into different life cycle stages. For example, the contribution of the ingredients to the overall impact is depicted separately.

The highest share of environmental impact is caused by packaging due to the use of aluminium cans. The resource-intense aluminium production for the packaging causes 64% of the GHG emissions.

The ingredients cause about one third of the environmental impacts, which depend especially on sugar production and the use of synthetic substances. The GHG emissions of the ingredients contribute about 15% of the overall emissions.

The transport and distribution have a way smaller percentage in the overall environmental impact if produced and consumed in the same country. Concerning GHG emissions transport and supermarket both have a share of approximately 10%. This share depends on the transport distance and rises considerably for drinks exported to overseas countries.

The category others make just a small share in the environmental impact and the GHG emissions, therefore it is not as relevant.

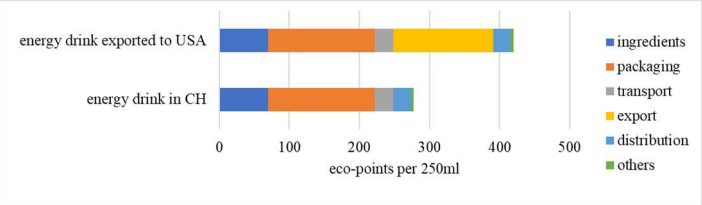

Fig. 1: Environmental impact of one energy drink can (250ml) at the Swiss supermarket and exported to the USA.

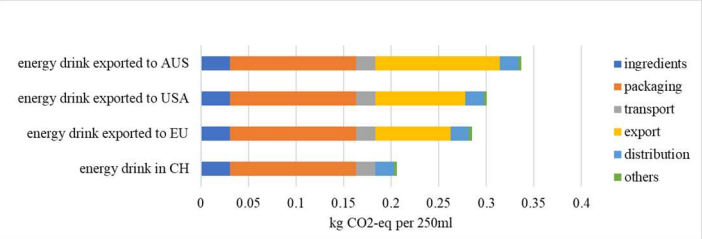

Fig. 2: GHG emissions of the one energy drink can (250ml) at the Swiss supermarket and exported to different destinations.

Discussion

The aluminium for can production contains an average share of recycled aluminium. With this approach the recycling share of the used cans is not relevant. Aluminium production dominates the impact categories global warming, air pollution, radioactive waste, heavy metal outflow, and energy use. So, there is a high potential to reduce the environmental impact of one energy drink by using a more sustainable packaging.

The sugar production influences the impact categories of land use, water pollution and soil pollution due to the high use of pesticides. The synthetic substances impact the categories of global warming and water pollution. The share of ingredients is smaller for GHG emissions than for environmental impact. This is due to sugar production, which has a larger effect on water pollution than global warming. By reducing the high quantity of sugar used in the product, the environmental impact could be reduced. The origin of the sugar does not influence the environmental impact as differences in production patterns are not known here.

The transport and the distribution contribute to a small amount to global warming, air pollution and noise. The transport is dependent on the distance between production site and consumer. If it is exported e.g., to the USA, the environmental impact per can increases significantly. The impact is smaller if the energy drink is consumed in New York, than in the middle of the country. The practically equal percentage of the distribution, compared to transport, can be explained by the rather high price for a can of energy drink. This high price might also be due to the marketing efforts which are not included in the assessment.

In conclusion it can be said that one energy drink can influences especially the environmental impact categories of global warming, air pollution and water pollution. The high amount of sugar should be overthought, and the material of the can should be replaced.

Literature

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