

Critical Review

Review of the report "*LCA of Fresh and Dried organic apple fruits produced in Sweden*"

by Group 12

Over all comments

This is a well structured report with sufficient background information, clear stated goal and scope, reasonable assumptions, good methodologies and informative tables and figures that facilitate a good understanding of the selected topic for readers.

The topic is novel that arises curiosity to readers, while the choice of conducting a consequential LCA is quite impressive (as it is required that every group should conduct attributional LCA is the project). The group made nice choice of impacts for comparison, such as cumulative energy demand and climate change, which we think is of the most interest for target audience. The results are quite well analyzed from a life cycle perspective.

The language in the report is reader-friendly. In spite of some minor spelling and grammatical errors, some incorrect referring and lack of lowered numbers in the chemical formulas, for example CO₂ was written instead of CO₂, the report is in general understandable. However, it is strongly suggested that do not use abbreviations in academic report; for instance, write "does not" instead of "doesn't". Besides, sentence directly taken from other sources is recommended to be in italic.

Transparency and completeness

The report is completed in a good way. Firstly, it has covered all the parts required in guideline. The work is easy to follow. Content of the report is consistent in a way that answers the most questions defined in objectives, although it lacks strong evidence to support. Secondly, the report has detailed, clear assumptions, which are good; however, the report has no clear discussion of assumptions that gives insufficient knowledge to audience of the limitations of the project. On the other hand, within the recommendations it is stated that further detailed LCAs of the topic would be preferred, this shows good insight of that the simplification of the LCA has to be more carefully investigated to give a more trustworthy result. Data and figures are very well stated, thus gives the report a good level of transparency.

Methodology

In addition to ReCipe Midpoint (H), the group has selected CED as additional method for descriptive analysis of energy demand, which is a very good selection of choice. The group also made a brief description of the choice. If more explanation could be made, the use of CED method may become more reasonable for audience. The group has made sensitivity analysis on distribution distances. Though this section contributes to the completeness of the report, the scenarios do not give any valuable insights that help to make better application, since it is a common sense that the longer distribution distance gives rise to higher environmental loads.

Clarity of results and conclusions

The results are well explained and documented. The figures and tables used in result part are very relevant to the content that could sufficiently facilitate readers' understanding of the results. The conclusions also provided answers to the goals of the

report. However, a big problem is that the results are not corresponding to the character of consequential LCA and it in the end turned to be attributional comparative LCAs since the results are not describing the differences of producing one product than another. *“When comparing two products, the result is the difference in environmental impact caused by fulfilling the functional unit with one or the other product (obtained by subtracting the result for one of the products from the results for the other product).”* stated on LCA organization website (<http://consequential-lca.org/clca/why-and-when/>). Hence, more descriptions and illustrations are required in results if the project is a strict consequential LCA study.

Improvements

An essential concern arises from reading the report is the selection of functional unit. It is understandable that the group tries to conduct a consequential LCA. Hence instead of choosing 1 ton of final products at customer, the group selected 1 ton of fresh apple at farm gate in order to analyze the consequences of producing sliced dried apple than fresh apple fruit. However, it is very worth of discussing on the reasons of such selection, and a clear define of function the system provides. Besides, the topic is novel but it would be interesting with an explanation of why to compare dried and fresh apples. Would it be as healthy to eat dried apples as fresh? Or are they both considered as a choice of snacks?

Other minor recommendations are:

1. A more brief abstract is suggested as many details mentioned in current version is not necessary;
2. Present more motivations and explanations of some assumptions. For example, why 20 days is selected as duration of storage cooling? If normally the cooling is between 10-30 days according to the literature, so it is OK to select average value 20 days for the study. It is necessary to state these descriptions in the assumption so that the readers can judge if the assumption is reasonable or not. Besides, a discussion on the accuracy of the referenced sources is suggested;
3. To correct grammar and spelling mistakes as well as to update table of content;
4. Interpret if waste management considered in the system, whether the results would have great changes. This will bring more completeness of the LCA study.