

Systematic, efficient and consistent LCA calculations for chemical and biochemical processes - DTU Orbit (09/11/2017)

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Life Cycle Assessment or LCA is a technique, which is applied for the study and evaluation of quantitative environmental impacts through the entire life cycle of products, processes or services in order to improve and/or evaluate the design of existing as well as new processes. The LCA factors can be used to identify and to improve the process environmental hotspots in order to make the process more sustainable. To complete the sustainable development of a process design, it is therefore necessary to consider both economic and environmental aspects. For this purpose, the LCSOFT, a tool for systematic and consistent calculation of LCA factors has been developed (Supawanich et al., 2015). LCSOFT integrates with other tools such as process simulation (PROII/ASPEN), ECON (economic analysis) and SustainPro (sustainability analysis) and provides for a specified boundary, all the established LCA factors. In this paper, new features that have widened the application range of LCSOFT are presented together with evaluation of their performance. More specifically, this research focuses on improvements of the software performance in terms of extension of the LCI database and new calculation options that allow a wider coverage of chemical and biochemical processes. Improvements of LCIA calculations and eco-efficiency evaluation are introduced. Also, a new model for photochemical ozone formation has been developed and implemented. Performance of LCSOFT in terms of accuracy and reliability is compared with another well-known LCA-software, SimaPro for a biochemical process – the production of bioethanol from cassava rhizome. The results show a very good match of new added impact categories. Also, the results from a new feature in LCSOFT, which is eco-efficiency evaluation, are presented.

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