

Sustainable Process Design under uncertainty analysis: targeting environmental indicators - DTU Orbit (08/11/2017)

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This study focuses on uncertainty analysis of environmental indicators used to support sustainable process design efforts. To this end, the Life Cycle Assessment methodology is extended with a comprehensive uncertainty analysis to propagate the uncertainties in input LCA data to the environmental indicators. The resulting uncertainties in the environmental indicators are then represented by empirical cumulative distribution function, which provides a probabilistic basis for the interpretation of the indicators. In order to highlight the main features of the extended LCA, the production of biodiesel from algae biomass is used as a case study. The results indicate there are considerable uncertainties in the calculated environmental indicators as revealed by CDFs. The underlying sources of these uncertainties are indeed the significant variation in the databases used for the LCA analysis. The extended LCA procedure is flexible and generic and can handle various sources of uncertainties in environmental impact analysis. This is expected to contribute to more reliable calculation of impact categories and robust sustainable process design.

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