

Input/output and Hybrid Life Cycle Assessment for supporting the assessment of production and consumption patterns

Michele De Rosa, Jannick Hoejrup Schmidt

May 8, 11:05 - 12:45, Hall 100

A process-based LCA of products or services relies on a bottom-up inventory data collection: this is expensive and time-consuming, because data have to be collected for each process in the life cycle, and provides an incomplete picture of the product systems, because of cut-offs limit the inventory data collection to an incomplete system with predefined boundaries. An alternative approach is a hybrid approach, merging process-based LCA with economic Input/output (IO) databases. IO databases have the advantage to cover the complete economy: data on economic transactions and environmental extensions are consistently collected for all industries in the economy. A Hybrid analysis allows benefiting simultaneously from the high level of completeness (no cut-off) from the IO data and from the high level of detail from the process-based data. Since 2003, SETAC and the broader LCA community have dedicated increasing attention to this methodology but progresses have been slow due to several reasons, e.g. i) the heterogeneity between national IO models and the consequent low geographical coverage of the hybrid unit IO models available (FORWAST, US IO-database), ii) an initial knowledge gap between the two scientific fields of LCA and economic models, and iii) a strong tradition in using the process based LCA approach. Recently, the construction of new Multi-Regional IO (MRIO) databases has provided more details on products and industries with a better geographical coverage (e.g. EXIOBASE, the World Input-Output database and GTAP), while largely improving the homogeneity of data. IO databases have been developed in 'hybrid units', i.e. not only monetary units, bringing them closer to traditional process-based data: units of tangible product and waste flows are given in kg and MJ (FORWAST and EXIOBASE). These developments have opened considerable opportunities to Hybrid LCA. In this session, we invite contributions on the integration of industry or process-based data into macroeconomic IO databases that may, for example: 1) Present methodological advancement in Hybrid LCA methodologies (e.g. tiered or embedded approaches); 2) Discuss the opportunities for future LCA applications; 3) Present case-studies based on Hybrid LCA modelling, applied to environmental or socio-economic analyses; 4) Illustrate examples on how to link IO data with other data, such as biodiversity, surveys or GIS data, for LCA analyses; 5) Discuss the uncertainty arising when linking such multiple data sources through sensitivity analyses and the uncertainties introduced by necessary methodological assumptions.