Life cycle assessment applied to wastewater treatment plants: how the choice of background processes can affect the studies’ reliability

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ABSTRACT

Considering the lack of transparency and representativeness of the data, one of the main challenges for the application of the life cycle assessment (LCA) to wastewater treatment plants (WWTP) is to improve the quality of the inventories. Most of the works published in the technical or scientific literature show that life cycle inventories (LCI) are not detailed, which makes it difficult to identify what is actually included and which background processes were used in the database. Therefore, even though the LCA can be applied to assess the environmental performance of a WWTP, it does not mean that the studies are reliable, especially in developing countries. This paper investigates how the choice of background processes in the database can affect and reduce the reliability levels of the LCA applied to a WWTP. Sensitivity analysis was used and the impact categories were those available in the (Leiden Centre of Environmental Science) CML method (one of the well-established methods for WWTP environmental performance investigation and the one most applied in LCA relating to these facilities). The study highlights the importance of specifying the background processes used as a requirement for improving the LCA studies. Additionally, a good practice when elaborating LCI is recommended, with the aim of ensuring that the results can be carefully analyzed before being used by decision-makers.

Keywords: Background database; Life cycle assessment; Reliability; Sensitivity analysis; Wastewater treatment plant

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