

Hydropower Life-Cycle Inventory: A Brazilian case study

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The development of Life-Cycle Inventories (LCI) are far the most time consuming task within Life-Cycle Assessment (LCA) activities. Notwithstanding, it is indispensable for LCA to be done in reasonable time, accessible cost and high quality, and efforts have been made in different countries to develop databases adapted to their conditions.

In Brazil the same process has just started developing a first Brazilian LCA database, in which one of the first struggles was steered to the electricity mix, composed by 86% from hydropower.

A preliminary challenge was the product system definition, once databases generally consider hydropower as a virtual entry, to estimate energy balance, or just includes reservoir greenhouse gas emissions. Very few studies analyzes the environmental load of dam construction and operation, nevertheless some specialists have already pointed down its importance.

On the Brazilian case, this issue was considered particularly relevant, due to the size of Brazilian dams, including Itaipu Plant- the larger energy production facility in the world, with 12,6 GW of power and a generation of 230 GWh/day. Considering this huge capability, responsible for 22,4% of Brazilian consumption, the LCI of Itaipu Plant was developed as a first Brazilian hydropower inventory.

Between other difficulties, the LCI elaboration faced the absence of representative inventories for the most important feedstock (steel, cement, diesel, lubricant, copper, transportation and the operation of civil work machines), which demanded the elaboration of parallel LCI's.

This paper intends to present the most significant contributions of this study, in terms of the production system modeling, LCA definitions, LCI development and results and some interpretation considerations.

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