

LCA – Supported methodology for the development of cement-based products

Summary

There is a permanent search for innovative and sustainable CBM around the world, including a concrete composition with a lower carbon footprint or an insulating mortar with the lowest thermal transmittance. However, this often lead to the incorporation of non-traditional raw materials, either innovative chemical products (e.g. admixtures with special characteristics or nanomaterials) or recycled or sub-products from different industries. There is therefore a need to support the researchers involved in these studies with a methodology that can reveal in real-time the environmental performance of the different compositions being tested, based on Life Cycle Assessment (LCA) method, and warn against any ecotoxicity concern of the non-traditional raw materials being used.

Such methodology is not yet available, and LCA studies usually rely on commercial tools for any product, process or activity. Therefore, this work intends to develop, calibrate, validate, implement in computer and patent an innovative methodology that provides a live support to the development of sustainable CBM with absence of toxicity risks. This methodology is based on LCA and toxicology database of raw materials for concrete and mortars, including novel data for non-traditional raw materials. The thesis starts with the development of a database of environmental and toxicity information of raw materials for CBM, using a novel methodology (NativeLCA) already developed and validated by the first and third supervisor, and including not only virgin materials, but also non-traditional components such as recycled and co-products, and nano and chemical-based products. For any raw material for which data are not yet available, novel data will be collected directly from producers based on LCA methodology.

Next, a methodology to support the development of innovative and sustainable CBM will be developed, and calibrated based on products already developed by the supervisors, and validated in the optimization in real-time of products being developed in ongoing projects. Finally, the routines and procedures of the methodology will be implemented in computer, and a national patent for Computer-Implemented Inventions (CII) will be requested.

Keywords

Life Cycle Assessment (LCA), Cement-based Construction Materials (CBM), Environmental Impacts (IA), toxicity risks, NativeLCA methodology, computer methodology.



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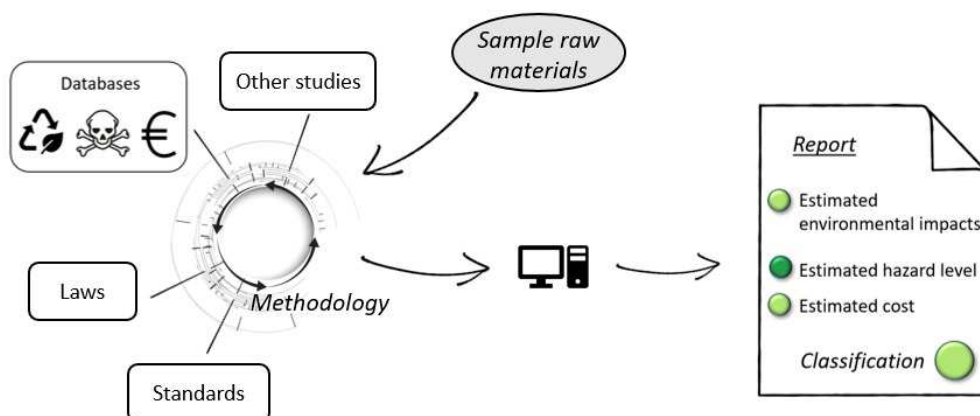
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Methodology scheme.