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Environmental assessment in the building materials industry: How are the results of Life-Cycle-Assessment (LCA) for concrete influenced by technology and regulations?

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As raw materials are becoming increasingly scarce worldwide, sustainability in the building materials industry is a challenge faced by individual companies as well as countries. In the building material industry, sustainability concerns are dominated by the role of raw materials, especially in the production of cement (e.g. fuels) and concrete (e.g. recycled aggregates). To investigate the environmental impact of the building materials industry, a widely accepted tool is the life-cycle-assessment (LCA). Although LCA is frequently used to evaluate the sustainability of building materials, recent studies show that the interpretation of LCA results can be difficult due to ambiguity of underlying assumptions.

In the ongoing research project *“Co-Evolution of Business Strategies in material and construction industries and public policies”* we analyse how the results of LCA for concrete building materials are influenced by the state of production technology, regulations (e.g. waste treatment), socio-technical settings (e.g. energy supply systems) as well as the choice of LCA-allocation rules. To develop a more transparent and generic model, we will improve the life-cycle assessment of concrete by integrating Material Flow Analysis and empirical data collected in case studies on the Swiss construction sector and available databases (e.g. Ecoinvent). We will then test the model for sensitivity and run scenario calculations to analyse the relevance of biases regarding their environmental impacts. In a last step, we will analyse the influence of different calculating techniques used in previous LCA studies of concrete. This will result in practical guidelines for the interpretation of LCA results of concrete building materials, and on the other hand advance LCA calculating techniques for this product category.