

Construction, deconstruction, reuse of the structural elements: the circular economy to reach zero carbon

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The research work presented aims at setting up an infinite cycle of use of materials by their reuse and answering in particular to the problems of circular economy. Structural work and foundations represent the majority of the embodied energy of a building. The research effort is therefore focused on the structural elements. Reuse is here defined as the reuse of an element without transformation, unlike recycling which induces a new industrial cycle. It is therefore about reducing the consumption of materials and lowering GHG emissions. Today, it is impossible in France to reuse structures because of responsibilities, insurance and lack of traceability. How to make possible the reuse of structural components in order to reach a low carbon building? The challenge of this work is to find the best structural configuration making the components reuse easier at the EOL. The methodology we are implementing aims to design the structural elements by increasing the BIM parameters (6D, LCA), to attach the mechanical information, material durability, ageing to each object of the digital mock-up. A digital and physical traceability makes it possible to follow the evolution of the element over the years and to feed a database. At the end of its life the database is accessible and searchable for the design of a future building. A development of tools and gateways will then allow from a model of calculation to go to query the database to find an element resulting from the deconstruction that can be reused in the future structure.

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