DESIGN WITH THE DURABILITY: LIFE-CYCLE ANALYSIS

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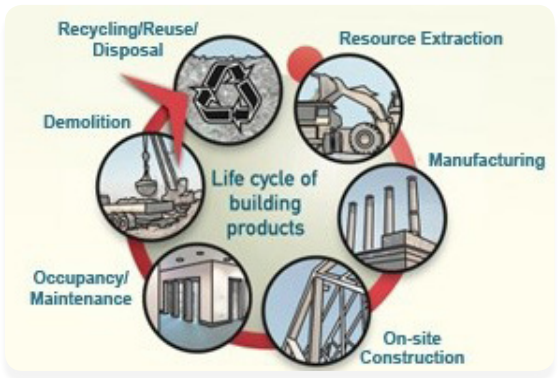
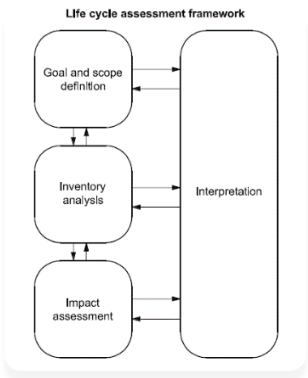
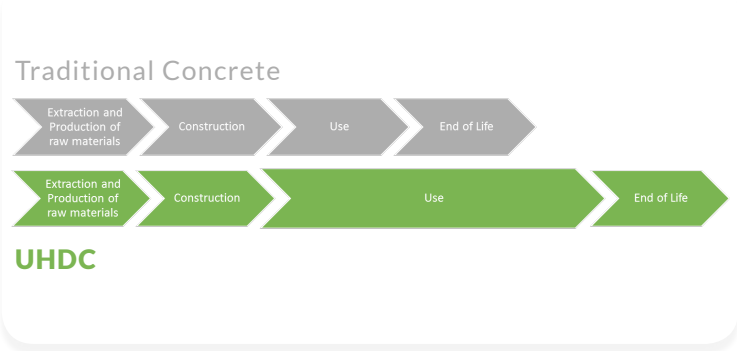
According to the definition provided by the Brundtland Commission (1987), Sustainable development is development that meets the needs of the present without compromising the ability of future generations to meet their own needs. This goal can be achieved in different ways, guaranteeing safety, human health, innovation, flexibility, emission reduction, and so on, but always considering a life-cycle approach. With regards to the sustainability achievement of infrastructures, an innovative contribution can be provided by acting on the service life. The specific objectives of the ReSHEALience Project include the development of Ultra-High Durability Concretes and the formulation and validation of a Durability Assessment-based Design approach for infrastructures installed in extremely aggressive environment; their combined application will enable and validate an overall increase of the infrastructures service life of at least 30% compared to the traditional concrete ones.

In the life-cycle perspective, the innovative solutions would have a longer operational life and would include less maintenance activities. Nevertheless, in order to assure that the innovative concretes provide a positive balance in environmental, economic and social terms, respect to the traditional ones, it is necessary to study all the life cycle phases of both solutions and, finally, compare them.

Sustainability assessment can be performed by standardized approaches as: Life Cycle Assessment (for environmental sustainability assessment); Life Cycle Costing (for economic sustainability assessment); Social Life Cycle Assessment (for social sustainability assessment). These three methodologies can be combined in the Life Cycle Sustainability Assessment, which provides a single final sustainability parameter. The ongoing activities of ReSHEALience Project include the LCA, which is performing according to ISO 14040 and 14044. Four steps are necessary to the Life Cycle Assessment: Goal and Scope, where Functional Unit and System Boundaries are set (the latter provided according to EN 15804); Inventory, where data are collected; Impact Assessment, where emissions are evaluated; Interpretation, where results are analyzed and alternative solutions are suggested in order to reduce the impacts. The Sustainability assessment is performed on two different concrete infrastructures: Cooling Tower Water Basin and an Aquaculture Mussel Raft, both designed with traditional and innovative concretes.







VIEW THE COMPLETE PRESENTATION

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