

LCA in Infrastructure

Life Cycle Assessment (LCA) for buildings and infrastructure is a method used to evaluate the environmental impacts associated with a building's life from cradle to grave (i.e., from raw material extraction through materials processing, manufacture, distribution, use, repair and maintenance, and disposal or recycling). This is done by identifying and quantifying energy and materials used and wastes released to the environment.

According to (Curran, 2012) the LCA process can be divided into phases: the definition of the goal and scope, the life cycle inventory analysis (LCI), the life cycle impact assessment (LCIA), the life cycle interpretation phase, reporting and critical review of the LCA, limitations of the LCA, the relationship between the LCA, and conditions for use of value choices and optional elements. This fully aligns with the ISO 14040 standard that also defines LCA as the compilation and evaluation of the inputs, outputs and the potential environmental impacts of a product system throughout its life cycle as well as the phase description.

For infrastructure that is used in multifunctional processes i.e., produces different products or services across its life cycle, it is sometimes necessary to allocate environmental impact. Two such methods are based on the principles of "avoided burdens" and "polluter pays". The "avoided burdens" method, also known as the 0:100 method or end-of-life method, is used to assess the environmental impacts of recycled and reused materials, components, products, or buildings. This method considers products with recycling or reuse potential and allocates the environmental impacts of their initial production to their final life cycle. The "polluter pays" principle, on the other hand, is based on the idea that the entity that causes environmental damage should bear the costs associated with it. In the context of LCA, this principle is often applied in the form of "cut-off" system models, where wastes are considered the producer's responsibility, and there is an incentivisation to use recyclable products, that are available burden free (cut-off).

The choice of methodology, scope, boundaries and limitations of a LCA varies after purpose. This manoeuvrability is an important aspect of LCA as it allows for a system to be described from multiple perspectives and thus attains the final phase described by Curran and the ISO 14040.

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