STEEL INDUSTRY GUIDANCE NOTES

Life Cycle Assessment of Buildings

The provision of all goods, services and products has some environmental impact and sustainable development is supported by methods and tools which can measure and compare these. Environmental impacts include those occurring from: emissions into the atmosphere; the consumption and extraction of resources; manufacturing the finished products; transportation; consumption/use and the end-of-life burdens (such as collection/sorting, reuse, recycling, waste disposal). The most widely acknowledged consequence of these impacts is global warming, caused mainly by CO_2 emissions, but that is only one of a range of results, which can also include issues such as ozone depletion, acidification, and deforestation.

The most commonly used method for the evaluation of impacts is Life Cycle Assessment (LCA), which can be defined as the process of evaluating the inputs and outputs of product systems and organising and converting those into environmental themes or categories relative to resource use, human health and ecological burdens.

What is the value of carrying out an LCA of a product system?

A Life Cycle Assessment can be used to identify "hotspots" in the life cycle of a product, i.e. those stages which contribute most to the overall impacts, or as a basis on which to compare the impacts of different products carrying out the same function.

How difficult is it to carry out a Life Cycle Assessment?

Undertaking an LCA can be complex, difficult and time consuming. A modern multi-storey building, for example, comprises thousands of components and hundreds of different materials. This requires a great deal of data collection and complex calculations.

What are the boundaries of a Life Cycle Assessment of a building?

The system boundaries of an LCA are set according to the scope of the study. However good practice would include: extraction of raw materials; manufacture into construction products; on-site construction; operation, maintenance throughout the life of the building; demolition; waste disposal; recycling and re-use.

All intermediate transport impacts should also be considered. In some cases not all stages are included, but the reasons for any exclusions should be clearly stated and justified.

What are the phases of a Life Cycle Assessment?

A Life Cycle Assessment includes: the definition of the objectives and scope of the study; an inventory analysis; an impact assessment and an interpretation of the results.

This is shown diagrammatically in Figure 1, which is taken from EN ISO 14040.

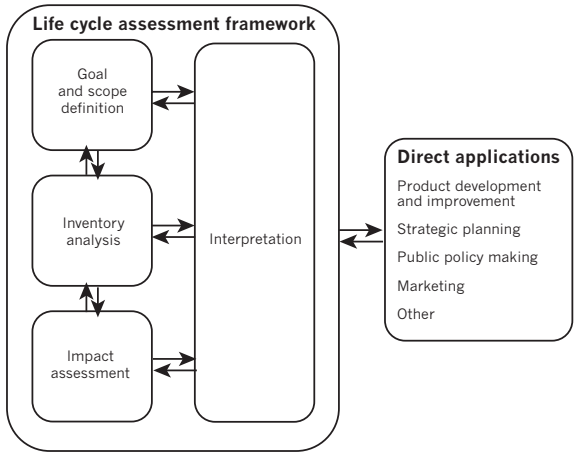

Figure 1 – Phases of an LCA

Is carbon footprinting part of a building's Life Cycle Assessment?

The carbon footprint of a building is a measure of one of the impacts, in this case greenhouse gas emissions calculated as CO_2 equivalent, which the construction and demolition activities have on the environment. It is often carried out as a comparative exercise between different methods, products or systems.

Carbon footprinting should be seen as a subset of a Life Cycle Assessment. It is generally carried out to determine embodied rather than operational impacts. It should include the influence of demolition and disposal at end of life, as that is where the most onerous or beneficial impacts are often concentrated.

Carbon footprinting is most beneficial when identifying those parts of the construction and demolition process which are responsible for the greatest impacts.

What information does the steel construction sector provide to enable a Life Cycle Assessment to be carried out on a building?

Corus has taken part in a comprehensive study of the environmental impacts of steel manufacture as part of a World Steel Association data gathering programme. Consequently, it is able to supply detailed guidance and data on the burdens of using steel in buildings, taking into account manufacture, end of life and recycling. See further sources of information.

The British Constructional Steelwork Association (BCSA) has also worked with the Steel Construction Institute (SCI) to map the burdens of the fabrication of structural steel. The result is that the steel construction sector can supply detailed guidance and data on the environmental impacts of its products which is unmatched in the construction industry.

What standards are available to assist with a Life Cycle Assessment?

The International Standards ISO 14040 and 14044 provide principles, framework, and methodological requirements for conducting LCA studies.

Key Points

1. Carrying out a Life Cycle Assessment is a complex and time consuming task requiring comprehensive and high quality data.
2. The steel construction sector can supply detailed guidance and data on using steel in buildings, taking into account manufacture, end of life and recycling which is unmatched in the construction industry.
3. The key to carrying out a Life Cycle Assessment of a building is defining the goal and scope of the study. Ideally it should be a full cradle to grave assessment that addresses all phases of the building life cycle.

Further sources of Information

1. **BS EN ISO 14040:2006 Environmental management. Life cycle assessment. Principles and framework. Available from the BSI**
2. **BS EN ISO 14044:2006: Environmental management. Life cycle assessment. Requirements and guidelines. Available from the BSI**
3. **For more information on LCA of Buildings contact the Corus advisory service. Email: construction@corusgroup.com**