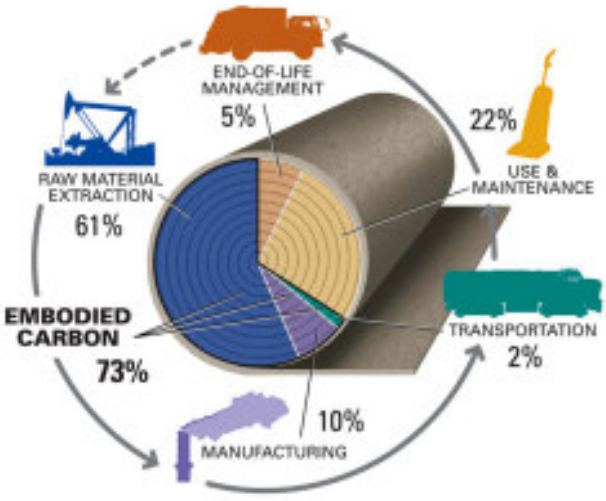
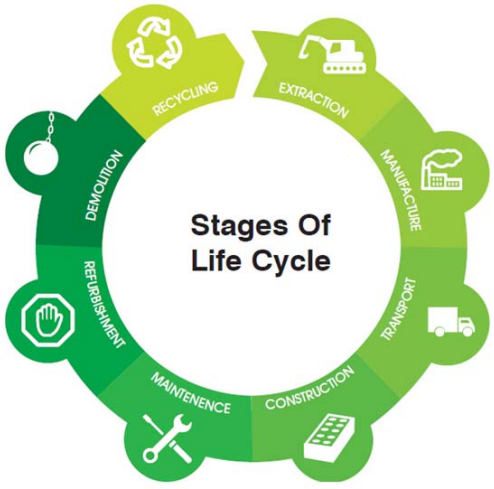
The Association for Preservation Technology International
Association internationale pour la préservation et ses techniques

TC•SP Technical Committee on Sustainable Preservation

A Glossary of Carbon Accounting and Historic Preservation from A(voided Impacts) to Z(ero Net Carbon)

As more attention is focused on the role buildings play in global energy consumption and carbon emissions, "zero-net" initiatives are emerging from many organizations, including Architecture 2030, AIA, CaGBC, and ASHRAE as an ultimate goal in sustainable design and building operation. Terms such as "zero energy building" and "carbon neutral" are used widely without standardized definitions or metrics, making it confusing to discuss this topic and even more challenging to evaluate carbon or energy performance across multiple projects. Additionally, most definitions of net zero are limited to the operations impacts of buildings, omitting embodied and end-of-life impacts. As buildings become more operationally efficient and the time value of carbon becomes greater, it is increasingly critical to account for the environmental impacts of every stage of a building's life cycle. This is particularly true for historic and existing buildings that offer the benefits of sunk carbon costs in addition to their historic value, which must be balanced against the environmental and preservation impacts of renovation and energy retrofit. This glossary provides common definitions of terms used to discuss carbon accounting and performance of buildings.





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Terms and Definitions

Avoided Impacts - Environmental impacts avoided by rehabilitation and reuse of an existing building compared to demolition and construction of a comparable new structure.

Boundary Conditions – Also referred to as system boundaries, these define the limits of a life cycle study. For example, is a study looking at impacts from cradle to gate? Cradle to grave?

Embodied Carbon – Quantity of emission of greenhouse gases during extraction, processing, transportation, fabrication, and assembly of a material or product. This number may or may not include use and end of life phases, but does not include operational impacts. [i]

Embodied Energy – The amount of energy consumed to extract, refine, process, transport and fabricate a material or product. [ii]

Environmental Product Declaration (EPD) – A document that communicates transparent and comparable information about the life-cycle environmental impact of products following an ISO standard, certified by the International EPD System. EPD's provide product data that can inform LCA.

Impact Category – Specific category of environmental impact being measured. Common impact categories include global warming potential, water use, acidification, eutrophication, ecotoxicity, and others. LCA results are presented as the potential impact the system has on a specific impact category or categories.

Life Cycle Assessment (LCA) – Scientific method for measuring the potential cradle to grave or cradle to cradle environmental footprint of materials, products and services over their entire lifetime. [iii] The assessment is divided into three phases: (1) pre-occupancy (2) occupancy (3) post-occupancy.

Life Cycle Costing (LCC) – Cradle to grave method similar to LCA, but used to quantify direct monetary costs rather than environment impact involved with a product or service.

Life Cycle Inventory (LCI) – Detailed accounting of all environmental inputs and outputs associated with every part of the system under evaluation. This can include hundreds of individual components and processes, and is sensitive to geography, database utilized, and other factors.

Zero Carbon Building (ZCB) – A building that produces onsite, or procures sufficient carbon-free renewable energy to offset the annual carbon emissions associated with operations. Frequently used interchangeably with Zero Net Carbon (ZNC).[iv]

Zero Energy Building (ZEB) – A building that produces onsite renewable energy sufficient to offset annual energy consumed by building operations. Frequently used interchangeably with Zero Net Energy (ZNE) and Net Zero Energy Building (NZEB).[v]

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[i] "Glossary of Terms and Definitions," Circular Ecology, 2017, http://www.circularecology.com/glossary-of-terms-and-definitions.html#.WdOkBdH_rSE
[ii] Circular Ecology.
[iii] "LCA, LCI, LCIA, LCC: What's the Difference?" Athena Sustainable Materials Institute, 2017, http://www.athenasmi.org/resources/about-lca/whats-the-difference/
[iv] "CaGBC® Zero Carbon Building Standard: Frequently Asked Questions," Canada Green Building Council, 2017, http://www.cagbc.org/CAGBC/Zero_Carbon/CaGBC_Zero_Carbon_Building_Standard__Frequently_Asked_Questions.aspx#2
[v] "A Common Definition for Zero Energy Buildings," US Department of Energy and National Institute of Building Science, 2015, https://energy.gov/sites/prod/files/2015/09/f26/A%20Common%20Definition%20for%20Zero%20Energy%20Buildings.pdf