



Life Cycle Assessment Tools

The green building movement is experiencing a fundamental shift in the way it approaches sustainable design, away from a prescriptive methodology - whereby materials are assumed to have environmental benefits based on rapid renewability, recycled content or other attributes - toward one that emphasizes measurable performance. Life cycle assessment (LCA) is a means to this end because it allows the impartial comparison of materials, assemblies and even whole buildings from cradle-to-grave, in terms of quantifiable impact indicators such as global warming potential.

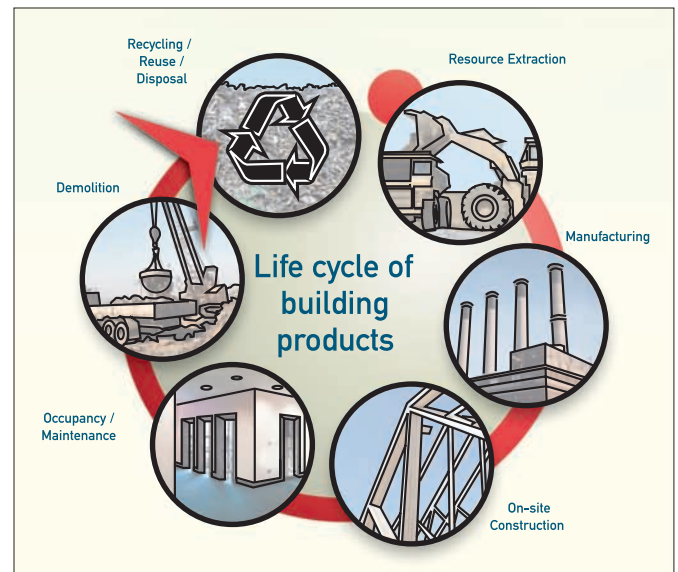
LCA is widely accepted in the environmental research community as one of the best ways to assess building sustainability. In the past, its use has been limited by the perception that it's too complex or time consuming for mainstream practitioners - but that is increasingly far from the case. Thanks to user-friendly tools from the Athena Institute and others, LCA is more accessible than ever before to architects, engineers, policy makers, manufacturers and developers, regardless of environmental design experience.

User-friendly Tools for Buildings, Assemblies and Products

In North America, Athena offers the only two tools for the life cycle assessment of whole buildings and assemblies - tools that are equally applicable to new construction projects, retrofits and major renovations, and to industrial, institutional, office or residential designs.

ATHENA® Impact Estimator for Buildings

At the heart of the organization is the acclaimed *Impact Estimator for Buildings*, which is capable of modeling 95% of the building stock in North America.



LCA is used to assess building materials from extraction and processing through manufacturing, transportation, use, maintenance and disposal or recycling.

It compares five or more design scenarios at once and generates results in various ways to meet the needs of different users - for example, by specific energy form or waste substance, life cycle stage or assembly type, or with varying levels of detail.

ATHENA® EcoCalculator for Assemblies

Based on information pre-generated by the *Impact Estimator*, the *EcoCalculator for Assemblies* provides instant LCA results for hundreds of common building assemblies. It was commissioned by the Green Building Initiative™ for integration with the Green Globes™ environmental assessment and rating system in order to make LCA more accessible to the mainstream design community. The *EcoCalculator* is available in generic form, free of charge, from the Athena website, www.athenaSMI.org.



Making Smart Choices through LCA

Without the kind of quantifiable data generated through life cycle assessment, material choices are often subjective.

For example, many people believe it's better for the environment to use materials produced within 500 miles of the structure being built. On the surface this makes sense - since less energy will be required to transport the materials. But there are a tremendous number of factors that influence whether or not a locally produced material is preferable, including the source of its components, type of manufacturing process and mode of transportation.

Another example is the common preference for rapidly renewable materials. Intuitively, it seems like a good idea to favor materials that regenerate quickly. But does it still make sense once the use of fertilizers and pesticides (including their production and transportation as well as environmental impacts), water requirements, manufacturing process and other relevant factors are all given due consideration?

With LCA, information is gathered on every aspect of a material at every phase of its life - and viewed through the lens of defined measures such as global warming potential, primary energy, air and water pollution, and natural resource use. As a result, design and construction professionals are able to make the kind of informed, scientifically-based choices that result in better buildings.

BEES® (Building for Environmental and Economic Sustainability)

At the product level, LCA results are accessible through software developed by the National Institute of Standards and Technology. Unlike the Athena software, BEES considers both environmental and economic indicators in one combined rating. It is used at the procurement stage of a project, and currently includes data for about 250 products (generic and manufacturer brands) such as floor and roof coverings, wall finishes and insulation.

All three tools comply with LCA methodology standards developed by the International Organization for Standardization (ISO) 14040 series. The *Estimator* and *EcoCalculator* use data from Athena's own widely acclaimed datasets and from the US Life Cycle Inventory Database, www.nrel.gov/lci.

Design Better Buildings with Athena

Athena's easy-to-use software allows architects, engineers and others to compare alternate design scenarios and incorporate environmental considerations while still at the conceptual stage of a project - when most critical decisions are made. This helps to put the environment on an equal footing with other more traditional design criteria, such as cost, functionality and aesthetics.

The Athena Institute is a non-profit organization dedicated to the sustainability of the built environment - a goal that can only be achieved by meeting the building community's need for better information and tools. Through offices in Canada and the United States, Athena furthers the use and science of LCA through groundbreaking software, world-class databases and customized consulting services, and by working collaboratively with the international research community.

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